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Safety and health of meat, poultry and fish processing workers

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Working Papers are preliminary material circulated to stimulate discussion and critical comments

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Introduction

The study on *Occupational Safety and Health in the Food and Drink Industries* was completed in 1993 at the request of the Food and Drink Industries Committee. [1] Its findings showed that accidents and diseases in these occurred more frequently than in many other industries in the manufacturing sector in a number of countries where data were available.

The study also indicated that common injuries in these industries included cut and stab wounds, lacerations, sprains and strains, bruises and fractures often caused by sharp hand tools, such as knives. Common diseases were hearing impairment, musculoskeletal disorders and respiratory disorders, skin diseases and infections transmitted by animals. These findings have drawn our attention particularly to the meat processing sector, which is closely associated with many of these findings.

Despite the limited data available for many countries, the study generated a considerable interest among ILO's tripartite constituents in occupational safety and health in the food and drink industries, and in the meat, poultry and fish processing industries in particular. This resulted in the Governing Body's decision at its 262nd Session (March 1995) to include the safety and health of meat, poultry and fish processing workers as one of the 16 sectoral meetings to be held during the 1996-97 biennium. Because of the ILO's subsequent financial constraints, however, a number of meetings, including discussion of this topic, had to be cancelled. Since information for the preparation of a report for this meeting had already been collected, the ILO decided to proceed with the compilation of the data as a study to be distributed among the tripartite constituents.

This study begins by reviewing recent trends in economic activities and employment, as well as working conditions in the meat, poultry and fish processing industries. The workers in these industries are a focus in this study because they share some similar features. For example, they process animals, regardless of their size, largely with sharp and sometimes heavy hand tools. They also work in wet and cold areas that ensure that their products meet food hygiene standards. These factors tend to contribute to creating a work environment where certain safety and health problems are prone to emerge. Finally, this study discusses specific preventive measures that have reduced accidents and diseases in some workplaces. These measures are presented as examples of best practices, which others may adopt to make their work environments safer and healthier.

The main objective of this study is to explore and expose the safety and health issues of workers in these sectors and their implications for these industries. This should help employers, workers and the tripartite constituents to become more aware of these issues, which in turn should lead to their cooperative efforts in reducing the number of occupational accidents and diseases and improving productivity.

Information specific to the meat, poultry and fish processing industries was not readily available in many countries. The data presented here were obtained from government agencies and from employers' and workers' organizations in a number of member States through ILO's field offices. Some data were also taken from statistical publications in the ILO library. A set of data from one country sometimes covers more or less than the three specific industries. The statistics presented are therefore not always internationally comparable. However, they still serve this study's main objective.

[1] Shizue Tomoda: *Occupational Safety and Health in the Food and Drink Industries*, Sectoral Activities Programme Working Paper No. 62 (Geneva, ILO, 1993).

1. Recent trends

1.1 Production, consumption and trade in meat, poultry and fish products

The rate of economic growth in terms of per capita GNP for the world as a whole was reported to be 1.2 per cent for 1980-92 and for high-income economies 2.3 per cent. [2] Such economic development has brought about a higher living standard, which gradually changed people's diet. As incomes rise in relation to the cost of living, consumers generally tend to spend more on protein products of animal origin than before.

Table 1.1.1 presents the per capita daily intake of protein of animal origin by region and country, which sharply rises in Asia whose economy grew rapidly in the 1980s. From 1970 to 1992, protein intake more than quadrupled in the Republic of Korea, nearly tripled in China, almost doubled in India, and grew by more than 50 per cent in Japan. In regions or countries where the protein intake was already quite high around 1970-80, it stagnated or even declined a little. It also declined in countries where the economy weakened or underwent drastic restructuring in the 1980s.

Though there have been fluctuations or even declines in some countries, the total world production, consumption and trade of meat, poultry and fish products have mostly risen steadily to meet a growing demand.

1.1.1 Meat

Table 1.1.2 presents the beef and veal production in metric tons in selected regions and countries for 1987-93. Production grew steadily in developing countries, and declined slightly in developed countries. Asia and the Pacific recorded the largest increase both in terms of volume and growth rate, followed by Latin America, the Near East, North Africa and sub-Saharan Africa. Production declined by 10 per cent in the European Union and by 15 per cent in eastern Europe.

Declining production in some of the major producing countries has been offset by other countries, such as China, whose production tripled. Total world production rose steadily, reaching its maximum in 1992.

The total world production of pork rose from 63 to 75 million metric tons between 1987 and 1993, a 19 per cent increase. It increased in all regions, except eastern Europe. Although it stagnated in the European Union at the end of 1980s, it was 8 per cent higher in 1993 than in 1987. Once again, the largest gain was recorded in Asia and the Pacific, with a 50 per cent rise over the same period.

[2] The World Bank: *World Development Report, 1994* (Washington, DC, 1994).

Table.1.1.1. Per capita daily intake of protein of animal origin by region and country (in grams)

Region/country	1970	1980	1990	1992
Region				
World	21.2	22.9	24.9	24.6
Africa	11.9	13.0	12.4	11.9
North and Central America	53.1	54.6	55.2	56.2
South America	27.4	30.0	30.1	31.3
Asia	9.0	10.8	14.8	15.7
Europe	49.0	57.2	59.4	58.1
Oceania	56.0	59.1	61.5	59.6
Country				
Egypt	9.2	11.5	13.2	12.9
Kenya	14.6	14.8	18.6	16.2
Cuba	35.1	35.2	33.8	27.9
Mexico	19.5	31.6	29.1	31.3
United States	66.7	67.8	71.7	73.5
Argentina	67.5	72.3	60.8	67.1
Brazil	20.1	23.4	26.8	27.1
China	5.7	7.5	14.0	15.9
India	5.8	6.6	9.0	9.5
Japan	36.3	45.0	54.8	55.7
Korea, Republic of	7.5	17.8	30.6	32.7
Czechoslovakia (former)	50.9	58.4	59.7	47.8
France	65.0	74.7	77.3	77.8
Germany	55.8	62.2	65.9	64.2
Poland	51.3	61.7	53.9	52.3
Portugal	33.6	35.9	52.1	54.5
United Kingdom	55.0	51.5	53.4	52.3
Australia	64.7	67.3	70.2	68.5
Fiji	20.8	32.2	34.0	38.1
New Zealand	67.0	76.2	83.5	78.2

Source: FAO: *Production Yearbook 1994*, Vol. 48, Rome, 1995.

Pork production at the country level shows that the largest increase in volume was again in China, where it increased from 19.3 to nearly 30 million metric tons, a 54 per cent rise between 1987 and 1993. The Republic of Korea doubled its production. Among industrialized countries, the United States and France increased their production by 18 and 24 per cent respectively. [3]

[3] FAO: *The state of food and agriculture* (Rome, 1994).

Table 1.1.2. Beef and veal production in selected regions and countries
(in 1,000 metric tons)

Region/country	1987	1988	1989	1990	1991	1992	1993
Region							
World	49 727	49 899	50 296	51 672	52 101	52 480	52 220
Developed countries	34 685	34 428	33 983	34 836	34 814	34 740	34 108
Developing countries	15 042	15 472	16 313	16 836	17 287	17 740	18 112
Asia and the Pacific	3 915	3 887	4 227	4 564	4 832	5 226	5 593
European Union (12)	8 576	8 075	7 853	8 464	8 897	8 602	7 811
Eastern Europe	1 943	1 835	1 829	2 053	1 890	1 637	1 646
Latin America	8 595	9 005	9 427	9 557	9 688	9 739	9 756
Near East and North Africa	1 341	1 337	1 481	1 481	1 515	1 552	1 522
Sub-Saharan Africa	2 128	2 163	2 193	2 249	2 279	2 300	2 301
Country							
Argentina	2 700	2 590	2 626	2 635	2 700	2 647[1]	2 716[1]
Australia	1 521	1 588	1 491	1 677	1 760	1 791	1 826
Canada	953	947	952	900	867	910	883
China	650	766	923	1 103	1 363	1 617	1 889
Denmark	235	217	205	202	213	217	203
Egypt	127[F]	152[F]	176[F]	180[F]	168[F]	161[F]	152[F]
France	1 963	1 828	1 673	1 912	2 026	2 079	1 703
Germany	2 099[1]	1 988	1 953	2 112	2 181	1 829	1 681
Japan	565	570	548	549	575	592	593
Kenya	219	238	228	250[F]	245[F]	230[F]	210[F]
Mexico	1 273	1 271	1 162	1 114	1 189	1 247	1 300[1]
Nigeria	267	236	218	204	205	210	219[F]
South Africa	628[1]	615[F]	603[1]	661[1]	700[1]	745[1]	729[1]
Switzerland	172	154	157	164	173	165	155
United States	10 884	10 879	10 633	10 465	10 534	10 612	10 586
United Kingdom	1 118	946	978	1 002	1 020	959	856
Former USSR	8 281	8 616	8 800	8 814	8 261	–	–

[1] Unofficial figure. F = FAO estimate.

Source: FAO: *The state of food and agriculture*, Rome, 1994.

An increase in production of any meat usually directly affects per capita consumption, unless population growth is much greater. Total global meat consumption in 1995, including poultry and mutton and lamb, was forecast at 203 million metric tons, of which the developing countries were expected to consume 104 million metric tons. The global per capita consumption was expected to be 35.3 kg and 23.3 kg in developing countries, 2 and 4 per cent higher, respectively, than in 1994. The major increase was expected in the Far East,

Latin America and the Caribbean. The per capita consumption in industrialized countries in 1995 was forecast to remain around 77 kg. [4]

However, the data on beef consumption in some countries show a gradual shift away from beef towards poultry meat, particularly among health-conscious consumers in industrialized countries. In the United States, for example, the annual per capita consumption of beef declined from 74 pounds in 1986 to 65 pounds in 1989, while pork consumption increased slightly, from 42 to 44 pounds. [5] The per capita consumption of total meat products in the European Union was 81 kg in 1992, though it ranged from 67 kg in the United Kingdom to 100 kg in Denmark. [6]

Meat consumption was lower in Eastern than Western Europe. In former Czechoslovakia, the per capita beef and veal consumption dropped from 23 kg for 1987-89 to 15 kg in 1992, and in Hungary it declined from 8 to 5 kg. The trend was similar in most countries, except for Bulgaria where it remained around 12.6 kg. Pork consumption also declined in most countries in this region.

A decline in per capita domestic consumption of beef has been compensated for in some countries by increased exports. As shown in table 1.1.3, the export of bovine meat by Australia and the United States climbed sharply in terms of value. In volume, US exports of fresh bovine meat increased from 225,000 to 437,000 metric tons between 1988 and 1992, while exports from Australia rose from 641,000 to 795,000 metric tons. [7]

Table 1.1.3. Ten principal exporters of bovine meat (millions of US$ ranked by 1992 values)

Country	1986	1988	1990	1992
World	8 246.5	11 346.3	13 458.5	17 425.7
Australia	922.1	1 487.3	1 810.9	3 596.9
United States	605.7	1 090.0	1 547.2	3 568.7
Netherlands	956.8	1 200.0	1 399.2	1 823.9
Germany	1 185.8	1 284.4	1 825.1	847.2
France	821.3	1 173.2	1 305.3	470.0
Ireland	676.0	863.2	861.9	449.9
New Zealand	373.6	630.2	640.5	406.8
Belgium-Luxembourg	274.4	430.0	599.9	360.2
United Kingdom	328.7	436.5	409.1	360.0
Denmark	339.9	430.9	417.9	357.2

Source: United Nations: *UNCTAD Commodity Yearbook*, Geneva, 1994.

The world's total import of bovine meat increased from US$8.7 billion in 1986 to US$15.9 billion in 1992. Italy and Japan were the two major importers in 1992 — US$2.2

[4] FAO: *Food Outlook*, Rome, Aug./Sept. 1995.

[5] Economic Commission for Europe (ECE), UN: *Food processing machinery* (Geneva, 1991).

[6] European Union (EU): *Panorama of EU Industry* (Brussels, 1994).

[7] UN: *UNCTAD Commodity Yearbook* (Geneva, 1994).

billion and US$2.1 billion, respectively, [8] which indicates that meat processing activities have become more important in meat-importing countries as well.

In addition to an economic downturn and health reasons, cattle diseases in certain parts of Europe have discouraged consumers from buying meat. The German Cattle Breeder's Federation estimated that beef consumption fell 10 per cent in 1994 because of bovine spongiform encephalopathy (BSE), or mad cow disease. The federation predicted a further 5 per cent decline for 1995. [9]

1.1.2 Poultry

Table 1.1.4 presents poultry meat production in metric tons in the world and in selected regions and countries. The total world production rose from 31 to 40 million metric tons for 1987-93, and production grew in all regions, except Eastern Europe. The rise in poultry meat production was impressive in a number of countries in both the developing and industrialized worlds. Both China and India more than doubled their production, while Brazil saw an increase of nearly 80 per cent. In Mexico, the Philippines and Thailand it increased by around 50 per cent. Among industrialized countries, a 40 per cent increase in the United States was the largest. This reflects a gradual shift in preference towards poultry meat over red meat in many countries. Although the demand for poultry meat in Europe has not been as dramatic as in the United States, the same trend is observed in Western Europe.

In most Eastern European countries, however, consumption declined considerably. In Bulgaria, it fell from 14 kg per head for 1987-89 to 8.4 kg in 1992, and in Hungary it dropped from 27 kg to 21 kg. In Poland it increased from 8.6 kg to 9.7 kg. [10] In spite of an 18 per cent decline in the industrial capacity in its abattoirs increased consumption in Poland was due to fluctuations in exports and imports of poultry products. Imports mainly from the United States climbed from 17,000 tons in 1991 to 40,000 tons in 1992, while exports declined from 18,000 to 13,000 tons. These changes were due to a rise in the domestic cost of cereals used as feed, as well as declined international competitiveness of the poultry industry in Poland. [11]

Table 1.1.5 shows the export of fresh poultry meat by region. Exports grew in all regions, the largest exporting region in 1993 being Europe. The growth rates in Africa and Oceania were impressive, though the total volumes were still small compared with the exports of other regions. Exports from Asia more than doubled, and imports by countries in the same region increased by 70 per cent.

[8] FAO: *Trade Yearbook*, 1990 and 1993, Vols. 44 and 47, Rome, 1991 and 1994.

[9] *Financial Times*, 14 Feb., 1996.

[10] UN: *The livestock and meat market*, Agricultural Review for Europe, No. 36, 1992 and Volume III, Geneva, 1994.

[11] Alain Pouliquen: "La privatisation des industries agro-alimentaires en Pologne", in *Le courrier des pays de l'Est*, No. 385, Dec. 1993.

Table 1.1.4. Poultry meat production in the world and in selected regions and countries
(in 1,000 metric tons)

Region/country	1987	1988	1989	1990	1991	1992	1993
Region							
World	31 190	32 687	33 350	35 093	36 672	38 364	40 005
Developed countries	20 011	20 577	20 995	21 626	21 766	21 973	22 170
Developing countries	11 178	12 110	12 355	13 467	14 906	16 391	17 834
Asia and the Pacific	5 507	6 150	6 394	6 882	7 631	8 556	9 272
European Union (12)	4 812	4 960	4 901	4 943	5 031	5 163	5 186
Eastern Europe	1 785	1 771	1 639	1 660	1 375	1 239	1 205
Latin America	4 387	4 659	4 637	5 207	5 859	6 368	7 043
Near East and North Africa	1 891	1 960	1 956	1 950	1 885	2 145	2 320
Sub-Saharan Africa	689	724	756	795	822	840	871
Country							
Argentina	380 [1]	340 [1]	300 [1]	336	379	500 [1]	590 [1]
Australia	355 [1]	362	368	385	393	421	435
Brazil	1 800 [1]	1 947 [1]	2 084 [1]	2 356 [1]	2 628 [1]	2 872 [1]	3 143 [1]
Canada	561	567	565	599	601	601	601 [F]
China	1 849	2 270	2 346	2 643	3 160	3 654	4 078
France	994	1 013	1 057	1 049	1 101	1 110	1 137
Germany	455 [1]	456 [1]	430 [F]	416	343	361	409
India	193 [F]	225 [F]	289 [F]	334 [F]	362 [F]	382 [F]	406 [F]
Indonesia	379 [1]	403	437	473	520 [F]	528 [F]	545 [F]
Japan	1 428	1 445	1 423	1 391	1 357	1 365	1 369
Kenya	44 [F]	40 [F]	44 [F]	48 [F]	48 [F]	48 [F]	48 [F]
Mexico	673	627	611	750	858	898	1 040
Spain	775 [1]	807 [1]	808 [1]	807 [1]	808 [1]	835 [1]	809 [1]
Nigeria	152 [F]	160 [F]	169 [F]	174 [F]	165 [F]	162 [F]	165 [F]
Egypt	207	179	144 [F]	139 [F]	147 [F]	160 [1]	170 [1]
Philippines	198	194	208	229	273 [1]	291 [1]	309 [1]
South Africa	350 [F]	360 [F]	370 [F]	380 [F]	390 [F]	370 [F]	380 [F]
Thailand	464 [1]	498 [1]	538 [1]	575 [1]	630 [1]	680 [1]	685 [1]
United States	7 250	7 513	8 055	8 597	9 117	9 719	10 214
United Kingdom	808	863	770	790	837	846	838

[1] Unofficial figure. F = FAO estimate.

Source: FAO: *The state of food and agriculture*, Rome, 1994.

Japan and Hong Kong, having imported 401,000 and 357,000 metric tons, respectively, in 1993, were the world's two largest importers. [12] Demand continued to rise in Japan for the first quarter of 1995 by over 40 per cent, compared with the same period in 1994. [13]

This information indicates that the poultry meat industry has become more important than ever in terms of turnover. Its rapid expansion affects the employment and working conditions of an increasing number of workers in many countries.

Table 1.1.5. Export of fresh poultry meat by region (1,000 metric tons)

Region	1989	1991	1993
World	2 214.3	2 742.0	3 684.6
Africa	0.9	2.7	8.6
North and Central America	490.7	650.7	1 034.6
South America	260.9	368.1	541.5
Asia	239.3	372.1	510.5
Europe	1 221.1	1 345.8	1 582.4
Oceania	1.4	2.6	7.0

Source: FAO: *Trade Yearbooks 1990 and 1993*, Vols. 44 and 47, Rome, 1991 and 1994.

1.1.3 Fish

A gradual shift away from red meat in many industrialized countries is also related to the rising demand for fish and fishery products that normally contain less fat and cholesterol. Thus health-conscious consumers are turning increasingly to fishery products.

Table 1.1.6 presents the nominal catches of fish, crustaceans, mollusca, etc. in the world by major fishing countries. The total world catches peaked in 1989 and then declined and stagnated. A similar pattern occurred in many countries, but the catches in China, India, Indonesia and Norway continued to increase.

Table 1.1.7 presents the major importers and exporters of fishery commodities for 1990-92. Despite a decline in many countries since 1989, exports continued to rise for many of the exporting countries in terms of US dollar values. The United States, for example, saw its catch decline by 270,000 metric tons between 1990 and 1992, while its exports increased by US$560 million.

[12] FAO: *Trade Yearbook*, op. cit.

[13] FAO: *Food Outlook*, op. cit.

Table 1.1.6. Fish, crustaceans, mollusca, etc.: Nominal catches by principal producers and world total (in 1,000 metric tons)

Country	1987	1988	1989	1990	1991	1992
World total	94 403	99 086	100 311	97 556	97 052	98 113
China	9 346	10 359	11 220	12 095	13 135	15 007
Japan	11 858	11 966	11 173	10 354	9 301	8 460
Peru	4 587	6 642	6 854	6 875	6 949	6 843
Chile	4 815	5 210	6 454	5 195	6 003	6 502
Russian Federation	– [1]	– [1]	– [1]	– [1]	6 894	5 611
United States	5 992	5 956	5 778	5 870	5 489	5 603
India	2 907	3 125	3 640	3 794	4 044	4 175
Indonesia	2 584	2 795	2 948	3 044	3 252	3 358
Thailand	2 779	2 642	2 670	2 786	2 968	2 855
Korea, Republic of	2 877	2 732	2 841	2 843	2 521	2 696
Norway	1 949	1 840	1 910	1 911	2 096	2 549
Philippines	1 989	2 010	2 099	2 209	2 213	2 272
Denmark	1 708	1 974	1 929	1 518	1 796	1 995
Iceland	1 633	1 758	1 502	1 508	1 050	1 577
Spain	1 526	1 593	1 560 [F]	1 400 [F]	1 320 [F]	1 330 [F]
Canada	1 565	1 610	1 573	1 624	1 535	1 251
Mexico	1 419	1 373	1 470	1 401	1 453	1 248

[1] Data not available. F = FAO estimate.

Source: FAO: *Fishery statistics, catches and landings, 1992*, Vol. 74, Rome, 1994.

Table 1.1.7. International trade in fishery commodities by principal importers and exporters (in million US$)

Country/area	Import			Country/area	Export		
	1990	1991	1992		1990	1991	1992
Japan	10 668	12 086	12 832	United States	3 020	3 282	3 583
United States	5 573	6 000	6 024	Thailand	2 265	2 901	3 072
France	2 809	2 926	2 935	Norway	2 060	2 282	2 437
Spain	2 361	2 749	2 898	Denmark	2 165	2 302	2 320
Italy	2 458	2 690	2 643	Canada	2 270	2 168	2 085
Germany	1 900	2 114	2 191	Dther Asia	1 517	1 525	1 803
United Kingdom	1 911	1 911	1 907	China	1 302	1 182	1 560
Hong Kong	1 112	1 232	1 398	Netherlands	1 333	1 356	1 41D
Denmark	1 116	1 149	1 197	Korea, Republic of	1 363	1 500	1 366
Netherlands	844	977	999	Iceland	1 240	1 280	1 253
Thailand	794	1 052	942	Chile	866	1 067	1 252
Belgium	754	776	837	Indonesia	989	1 186	1 179
Portugal	606	758	785	United Kingdom	962	1 122	1 148
Canada	620	676	687	France	931	926	955
China	207	439	680	Russian Federation	–[1]	–[1]	826
World total	39 585	43 654	45 452	World total	35 752	38 892	40 276

[1] Data not available.

Source: FAO: *Fishery statistics, commodities, 1992*, Vol. 75, Rome, 1994.

Table 1.1.8 shows the global export of various fishery commodities for 1987-92 in metric tons. Except for frozen, dried and salted fish, other fish exports grew steadily. The figures show that the demand for fishery products continues to rise globally and has accelerated competition among fishing countries, which has unfortunately led to the gradual depletion of world fish stocks.

Fish stock in the ocean was once believed to be inexhaustible. A declining world catch in recent years is a warning to many fishing countries to enforce certain rules multilaterally to conserve the stocks. Today, the most valuable stocks, such as Atlantic cod and blue-fin tuna, as well as Indian Ocean shrimp, are said to be nearly depleted, so an increasing share of the global catch is made up of species previously ignored, or of small fry of the big species. Catches in the North Sea, for example, are as small as in the 1970s. [14]

Surprisingly, and contrary to the trend of a declining catch experienced globally, the world fish catch reached a new record of 106 million tons in 1994. This was due partly to strong growth in aquaculture output in China, and partly to the expansion of distant water catches by some countries, including China. [15]

Fish-producing countries should not be overly encouraged by this new record. They still need to intensify their efforts to protect global fish stocks. "Technical conservation measures", urged by many experts, include the use of fishing nets with larger mesh sizes and

[14] *Newsweek*, 25 Apr., 1994, pp. 30-35, and *The Economist*, 19 Mar., 1994, pp. 15-16.

[15] FAO: *Food Outlook*, op. cit.

panels that allow certain species and young and small fish to escape. Improved fish farming techniques are also recommended. [16]

Table 1.1.8. World production and exports of preserved and processed fishery commodities (net product weight in 1,000 metric tons)

Commodity	Production/ export	1987	1988	1989	1990	1991	1992
Fish fillets, fresh or chilled	P	326	316	301	300	309	304
	E	77	119	124	133	145	170
Fish fillets, frozen	P	1 569	1 634	1 552	1 774	1 793	1 676
	E	912	854	952	1 081	1 130	1 157
Fish, frozen (excluding fillets)	P	11 852	12 811	12 936	12 887	12 546	12 543
	E	3 401	4 165	4 117	4 791	4 783	4 520
Fish, dried, salted or pickled	P	3 365	3 478	3 170	3 304	3 278	2 974
	E	440	429	446	429	429	387
Fish, smoked	P	854	854	849	855	881	554
	E	33	38	38	44	48	59
Crustaceans and mollusca (all forms)	P	2 224	2 110	2 460	2 350	2 492	2 492
	E	1 465	1 549	1 644	1 653	1 866	1 989
Fish products and preparations[1]	P	5 453	5 560	5 729	5 827	5 797	5 390
	E	1 068	1 156	1 257	1 276	1 359	1 334

[1] Whether or not in airtight containers.

Source: FAO: *Fishery statistics, commodities, 1992*, Vol. 75, Rome, 1994.

1.2 Employment

The size of a workforce has usually been associated with the level of production in any given country. However, production is not always a reliable indicator of the employment level because of increased mechanization and trade in the meat, poultry and fish processing industries as well. The information presented above indicates that production and trade in the meat, poultry and fish industries expanded globally, though the meat industry in some industrialized countries is on a downward trend. How are these increased volumes of production and trade affecting employment in these sectors?

Many countries do not have breakdowns of employment data. Even when four-digit data exist, many countries have their own occupational or industrial classification system or their data are somewhat fragmented, which is why statistics are not often comparable internationally. Nevertheless, they are useful indicators of the situation and trend for the industries concerned.

[16] *Financial Times*, 8 Feb., 1996.

The industries covered are classified under codes 3111 (slaughtering, preparing and preserving meat) and 3114 (canning, preserving and processing fish, crustacea and similar foods) under Revision 2 of the United Nations' International Standard Industrial Classification (ISIC) of all economic activities.

Included under ISIC 3111 are: activities in abattoirs and meat-packing plants such as killing, dressing and packing cattle, hogs, sheep, lambs, horses, poultry, rabbits and small game for meat; processing and packing activities such as curing, smoking, salting, pickling, packing in airtight containers and quick-freezing; the manufacture of sausage casing, meat soups, meat puddings and pies; and the rendering and refining of lard and other edible animal fats.

The activities covered under ISIC 3114 are: salting, drying, dehydrating, smoking, curing, pickling, canning, or quick-freezing fish, shrimps, oysters, clams, crabs, and other seafoods; and the production of fish and seafood soups and specialities. Also included are the processing activities of fish and seafood only on factory-type vessels.

Under the newer version (Revision 3) of the UN's ISIC codes, published in 1990, code 1511 is assigned to the sector covering the production, processing and preserving of meat and meat products, and code 1512 to the processing and preserving fish and fish products. However, many of the member States that collect four-digit data have not switched to the new code numbers, and unlike some industries, there has been little change in the activities included under codes 1511 and 1512 from those under 3111 and 3114. Hence, the above description of the activities covered in this study is based on Revision 2.

Table 1.2.1 gives the numbers of establishments in the **Australian** meat and seafood processing industries by branch, and the numbers of employees by gender for 1986/87-1988/89. The numbers of establishments in all branches increased in the second year, but decreased in the third year, probably due to mergers formed because of intensified competition. The numbers of workers in these branches, except poultry, also stagnated or declined slightly. However, because of a rise in the number of poultry workers, the total employment in these branches increased a little.

Workers in the meat processing and preparation branches were mostly men, and the majority of poultry and seafood sectors were women. The proportion of female workers in the latter sectors declined, possibly due in part to a slow down in the meat sectors, which might have encouraged men to seek jobs in sectors that had been traditionally for women. Another set of data, based on the labour force survey and provided by the Government of Australia, give a different picture than that in table 1.2.1. According to these data, the total employment of "meat tradespersons (ASCO 4701)" for May 1988 was 31,374, which declined to 27,145 by 1993, but recovered to 31,534 by 1995.

According to the explanation provided, "meat tradesperson" included workers in the meat, poultry and smallgoods industries, which means that the total employment in this set of data for 1988 was much lower than that presented in table 1.2.1. Moreover, according to the figures on gender breakdown, there were only 155 women as opposed to 31,219 men working in 1988. By 1995, there were 475 women and 31,059 men. Despite the fact that the number of female workers tripled between 1988 and 1995, their proportion in this set of data is still very low compared with the figures in the table.

Table 1.2.1. Number of establishments and employees in the Australian meat and seafood-processing industries, by branch and gender (employees in thousands)

Branch	1986-87				1987-88				1988-89			
	Estab-lishment	Employees			Estab-lishment	Employees			Estab-lishment	Employees		
		Male	Female	Total		Male	Female	Total		Male	Female	Total
Meat, except small goods	379	24.9	4.9	29.8	392	25.5	5.0	30.0	385	25.0	4.5	29.5
Poultry	115	4.1	4.8	8.9	121	4.0	4.6	8.6	111	5.5	5.6	11.1
Bacon, ham and others	125	4.8	2.2	7.0	135	4.8	2.1	6.9	118	4.7	2.1	6.8
Seafood	91	1.4	2.2	3.6	105	1.6	2.1	3.7	94	1.7	1.8	3.5
Total	710	35.2	14.1	49.3	753	35.9	13.8	49.7	708	36.9	14.0	50.9

Source: Australian Bureau of Statistics: *Manufacturing industry: Details of operations, Australia*, Catalogue No. 82030, 1986-89 issues, Canberra.

Employment in the meat industry, including poultry, in the European Communities (**EC**) grew at a rate of 1.5 per cent for 1987-92, while total employment was 436,685 in 1992. On the other hand, a total of 82,893 workers were employed in 1992 in the EC's fish processing and preserving industries, after a 0.3 per cent annual decline in the same period. [17] How do they compare with the situations in the EU member States?

According to table 1.2.2, employment in the meat and fish processing sectors in **Belgium** grew by 7.6 and 8.5 per cent respectively, between 1987 and 1992. However, employment in the fish industry declined by 3 per cent during 1989-92, while that in meat rose by 2.5 per cent. These figures were more or less in line with the trend reported for the EU as a whole. As for breakdown by gender, women made up about one-half of the workforce in the fish industry, but were less than one-third in the meat industry. The increase in both men and women in the meat industry is due mostly to the expansion in the poultry industry.

Table 1.2.2. Employment in the meat and fish processing industries in Belgium

Industry	Gender	1987	1989	1990	1992
Slaughter and preparation and production of meat products [1]	Male	–	9 401	9 214	9 490
	Female	–	3 179	3 304	3 409
	Total	11 988	12 580	12 518	12 899
Preparation and production of fishery products	Male	–	626	607	602
	Female	–	606	642	591
	Total	1 100	1 232	1 249	1 193

[1] Including poultry workers and those in the public sector as well.

Source: 1987 data: Provided by the Government of Belgium for the ILO Second Session of the Food and Drink Industries Committee, Dec. 1991. 1989-92 data: Ministère de l'Emploi et du travail: *La population active en Belgique*, 1. estimation au 30 juin, 1989-92 series, Brussels.

Data on the entire country of **Brazil** are not available. The latest employment figures in the meat, poultry and fish industries in the state of Rio Grande do Sul were 5,230, 10,502 and 3,500, respectively, according to the Labour Ministry. Of these, about 80 per cent of meat workers were men, and 90 per cent of poultry workers and 80 per cent of fish processing workers were women. The male-female breakdown is similar to that in many countries. In the state of Parana, the latest available information shows 8,720 workers in poultry, of which about 80 per cent were men, and 3,934 workers in the meat industry, where both men and women are equally represented. No information was available on the fish industry.

The data in table 1.2.3 on **Canada** show that the employment in the meat and poultry industries combined rose sharply between 1994 and 1995, after a few years of stagnation. Employment in the fish industry declined steadily from 1991-93. Data were missing for 1994-95. Increased employment in meat and poultry was due largely to the expanded production of poultry meat, despite a decline in beef and veal production, as shown in tables 1.1.2 and 1.1.4. The declined employment in the fish industry is a reflection of a diminished catch, as presented in table 1.1.6.

[17] EU: op. cit.

Table 1.2.3. Employment in the meat and poultry and fish products industries in Canada
(March data; in thousands)

Industry	1991	1992	1993	1994	1995[1]
Meat/poultry products	37.2	41.7	41.7	41.6	48.3
Fish products	17.0	16.3	13.8	–[2]	–

[1] Preliminary data. [2] Data on the fish products industry no longer appear in *Employment, earnings and hours* from 1994 issues.

Source: Statistics Canada, Labour Division: *Employment, earnings and hours*, April issues 1991-94 and March issue 1995, Ottawa, Canada.

According to the information provided by the Ministry of Internal Trade in **China**, the meat and poultry processing sectors employ about 370,000 workers, of which men make up 57.5 per cent.

Table 1.2.4 shows the employment trend and the change in the number of establishments in the meat and poultry sectors in **France**. The number of establishments increased temporarily from 1987 to 1988 in the processing and preparation of meat products and slaughtering and processing of poultry, but then declined in both sectors. In slaughtering of animals, it decreased steadily. Employment in all these branches rose from 1987 to 1988, after which it declined in slaughtering of animals and in processing and preparation of meat products. In slaughtering and processing of poultry, it continued to expand till 1989, and then stagnated. The decline in the number of establishments and the employment trend are probably the reflection of intensified competition resulting in mergers and acquisitions of establishments, which subsequently affected the employment level.

Table 1.2.4. Number of establishments and employees in the meat industry in France
(employees in thousands)

Industry	Establishment/ employees	1987	1988	1989	1991
Slaughter	Establishment	1 219	1 195	1 118	991
	Employees	41.8	45.5	40.4	39.6
Processing/preparation of meat products	Establishment	1 354	1 374	1 309	1 247
	Employees	62.8	68.1	67.4	63.6
Slaughtering/processing of poultry	Establishment	410	435	419	385
	Employees	30.1	32.8	34.9	34.7
Total	Establishment	2 983	3 004	2 846	2 623
	Employees	134.7	146.3	142.7	137.9

Source: INSEE, Ministère de l'Economie, République Française: *Résultats No. 367-368-369, Emploi-Revenus*, Nos. 76-77-78, Feb. 1995.

Table 1.2.5 presents the number of establishments and full-time workers employed in the meat processing industry in **Germany** by size of establishment for 1993-94. It shows that more than 90 per cent of establishments were small, with less than 20 workers. It also indicates that many of these small establishments disappeared during that year and their numbers declined by 3 per cent. Perhaps they were forced to close or were absorbed by larger establishments. On the other hand, employment of full-time workers rose by 1 per

cent, which was observed mainly among the establishments employing 20 to 49 workers and 500 to 999 workers.

Table 1.2.5. Number of establishments and full-time workers in the meat processing industries in Germany, by size of establishment (1993-94)

Size of establishment [1] (No. of workers)	Establishment				Full-time workers			
	1993		1994		1993		1994	
	No.	%	No.	%	No.	%	No.	%
1–2	7 482	26.1	6 869	24.7	9 406	3.1	8 901	2.9
3–5	8 036	28.0	7 758	28.0	28 571	9.5	27 780	9.1
6–9	6 552	22.9	6 460	23.3	44 343	14.7	43 691	14.4
10–19	4 459	15.6	4 422	15.9	55 871	18.6	55 508	18.3
20–49	1 411	4.9	1 513	5.5	40 583	13.5	43 059	14.2
50–99	379	1.3	378	1.4	26 066	8.7	25 720	8.5
100–199	201	0.7	208	0.7	27 027	9.0	28 509	9.4
200–249	33	0.1	32	0.1	7 306	2.4	7 016	2.3
250–499	86	0.3	82	0.3	28 858	9.6	27 940	9.2
500–999	18	0.1	25	0.1	11 727	3.9	15 824	5.2
1 000 and above	13	–	12	–	21 209	7.0	19 842	6.5
Total	28 670	100.0	27 759	100.0	300 967	100.0	303 790	100.0

[1] According to the number of full-time workers covered by insurance for occupational accidents.

Source: Fleischerei-Berufsgenossenschaft: *Verwaltungsbericht 1994*, Mainz, Germany.

The distribution of workers by branch within the food, drink and tobacco industries in **Hungary** for 1985-89 is presented in table 1.2.6. Although employment in meat declined steadily, this subsector was the most important in the food, drink and tobacco industries, in terms of the size of employment. Although poultry was not one of the major branches, its employment grew by 16 per cent.

Table 1.2.6. Number of employees and proportions in the food, drink and tobacco industries in Hungary, by subsector

Subsector	1985	%	1987	%	1989	%
Meat	38 138	(18.9)	37 340	(18.0)	36 214	(17.9)
Poultry	14 169	(7.0)	15 676	(7.6)	16 372	(8.1)
Preserving	26 763	(13.3)	28 451	(13.7)	29 100	(14.4)
Milling	22 319	(11.1)	21 851	(10.6)	21 361	(10.6)
Bakery and pasta	28 351	(14.1)	28 735	(13.9)	27 199	(13.5)
Wine	9 842	(4.9)	9 636	(4.7)	8 590	(4.2)
Brewery	8 614	(4.3)	8 763	(4.2)	9 257	(4.6)
Tobacco	5 309	(2.6)	5 204	(2.5)	4 765	(2.4)
Others	47 820	(23.8)	51 365	(24.8)	48 981	(24.3)
Total	201 325	(100.0)	207 021	(100.0)	201 839	(100.0)

Source: Data were provided by the Government of Hungary for the ILO Second Session of the Food and Drink Industries Committee, 1991.

Table 1.2.7 gives employment changes in the livestock products and seafood processing industries in **Japan** for 1991-94, by size of establishment and gender. Employment for men in these two branches combined declined from 252,000 in 1991 to 240,000 in 1994, while that for women rose from 346,000 to 370,000. Men made up more than 50 per cent of the workforce in the livestock industry, while an overwhelming majority of seafood processing workers were women. Because of a decline in male employment, the women's proportion in the workforce in both sectors increased slightly over the period. The figures show that the majority of workers in Japan were employed in small establishments, as in Germany.

Table 1.2.7. Number of regular employees in the livestock products and seafood processing industries in Japan, by size of establishment and gender
(annual average in thousands)

Industry	Size (No. of workers)	Gender	1991	1992	1993	1994
Livestock products	5 or more	Male	79	81	78	77
		Female	69	69	70	72
	30 or more	Male	69	72	69	69
		Female	56	57	59	58
Seafood	5 or more	Male	63	65	58	58
		Female	144	157	142	151
	30 or more	Male	41	38	34	36
		Female	77	84	83	89

Source: Ministry of Labour: *Monthly labour survey, National survey*, Series Dec. 1991-94, Tokyo, Japan.

Employment distribution by gender and number of establishments in the meat and poultry and fish and shellfish industries in **Mexico** for 1990-94 are presented in table 1.2.8. Employment for both men and women in both industries increased until 1991 or 1992, and then declined. The number of establishments reflects more or less the changes in employment. However, the number of fish and shellfish processing establishments increased from 316 in 1993 to 328 in 1994, despite a decline in employment. In both these industries, men made up a large proportion of the workforce.

Table 1.2.8. Distribution of workers by industry and gender and the number of enterprises in the meat, poultry, fish and shellfish processing industries in Mexico (1990-94)

Industry	Gender and No. of enterprises	1990	1991	1992	1993	1994
Meat and poultry	Male	10 842	11 882	11 994	11 105	10 701
	Female	4 216	4 619	4 664	4 319	4 162
	No. of enterprises	537	607	708	616	588
Fish and shellfish	Male	7 061	6 928	6 500	5 668	5 314
	Female	2 746	2 694	2 528	2 204	2 067
	No. of enterprises	391	411	407	316	328
Total	Male and female	24 865	26 123	25 686	23 296	22 244
	No. of enterprises	928	1 018	1 115	932	916

Sources: IMSS: COORD.S.T., SUI-55/MT-5, 1994 and INEGI.PERFIL SOCIODEMOGRAFICO, Mexico, 1994.

Table 1.2.9 presents employment by gender in the meat, poultry and fish processing industries in **Poland** for 1988-93. Employment in the meat industry declined in 1989, but then showed a strong growth for both men and women. In the poultry industry, it continued to fall sharply until 1991, recovered a little in 1992 and stagnated in 1993. Employment in the fish industry showed a decline in 1993 after a stagnation during 1990-92. In both the meat and fish industries, men made up a large proportion of the workforce, though women were predominant in the poultry workforce.

Table 1.2.9. Employment by gender in the meat, poultry and fish processing industries in Poland, as of 31 December

Industry [1]	Gender	1988	1989	1990	1991	1992	1993
Meat	Men	43 127	41 809	43 036	47 733	58 390	60 922
	Women	34 937	33 600	34 161	39 345	44 007	44 725
	Subtotal	78 064	75 409	77 197	87 078	102 397	105 647
Poultry	Men	8 605	8 103	7 285	5 858	6 420	6 493
	Women	13 730	12 414	10 491	7 468	8 373	8 108
	Subtotal	22 335	20 517	17 776	13 326	14 793	14 601
Fish	Men	23 259	21 744	19 584	17 144	15 544	14 552
	Women	6 332	5 732	4 749	7 074	8 687	7 937
	Subtotal	29 591	27 476	24 333	24 218	24 231	22 489
Grand total		129 990	123 402	119 306	124 622	141 421	142 737

[1] According to the classification of National Economy (KGN).
Source: Central Statistical Office, Warsaw, Poland.

The number of establishments and persons employed in the slaughtering, meat preparation and fish processing industries in **Denmark, Finland, Norway and Sweden** are presented in table 1.2.10. The general trend in these Scandinavian countries was a gradual decline or stagnation in all these subsectors, as indicated in the decreasing number of establishments and persons employed.

Table 1.2.10. Number of establishments and persons engaged in the meat and fish processing industries in the four Scandinavian countries

Industry	Country [1]	No. of establishments			No. of persons engaged		
		1989-90	1991	1992	1989-90	1991	1992
Slaughtering	Denmark	128	113	104	20 165	19 485	18 764
	Finland	51	47	45	4 469	4 516	4 198
	Norway	91	88	85	5 241	5 030	4 903
	Sweden	59	57	55	8 283	8 054	8 249
Preparing and preserving meat	Denmark	51	48	49	5 959	5 743	5 770
	Finland	87	86	81	9 132	8 893	8 601
	Norway	144	140	137	6 143	5 948	5 737
	Sweden	107	110	126	8 345	8 563	9 959
Canning, preserving and processing of fish, crustacea, etc.	Denmark	114	113	120	9 322	8 641	8 529
	Finland	28	23	18	510	426	384
	Norway	393	355	351	11 579	10 550	9 877
	Sweden	56	55	51	2 460	2 326	2 398

[1] Denmark: Establishments with six or more persons engaged. Finland and Sweden: Establishments with five or more persons engaged. Norway: Establishments with five or more persons engaged (for certain industries – three persons).

Source: The Nordic Council of Ministries and the Nordic Statistical Secretariat; *Yearbook of Nordic Statistics*, Vols. 28-30, Copenhagen, 1990-92.

However, the meat preparation and preservation sector in **Sweden** showed a steady growth. This might have been due to an increase in the import of carcass meat, rather than finished products, to be prepared domestically. There was also a sign of recovery in its slaughtering industry for 1991-92, as shown in a rise in its employment, despite a continued fall in the number of establishments. A similar phenomenon is also observed in its fish processing industry. Successful restructuring and creation of new markets might have been behind these changes.

Table 1.2.11 presents employment in the meat and fish processing branches in the **United Kingdom** by gender and type of employment in 1989 and 1991. Employment in all these branches combined for both men and women and both full- and part-time workers increased a little from 1989 to 1991. This was due mainly to a rise in the bacon curing and meat processing sector, as there was little change in other branches.

While the full-time workforce in each of these branches was made up largely of men, part-time workers were mostly women. This gender characteristic of full- and part-time workers remained unchanged. When the numbers of full- and part-time workers were combined, the fish processing branch was the only sector where women outnumbered men. Women were active in bacon curing and meat processing, and in poultry slaughtering and processing industries. Employment in slaughterhouses and in the animal by-product processing sector continued to be strongly male oriented.

Table 1.2.11. Employment in the meat, poultry and fish processing industries in the United Kingdom (in thousands)

Industry	September 1989						September 1991					
	Male employees			Female employees			Male employees			Female employees		
	Full-time	Part-time	All	Full-time	Part-time	All	Full-time	Part-time	All	Full-time	Part-time	All
Slaughterhouses	8.2	0.2	8.4	1.4	0.6	2.0	8.4	0.2	8.6	1.3	0.5	1.8
Bacon curing and meat processing	25.3	0.7	26.0	16.0	6.8	22.8	27.1	1.0	28.1	16.5	7.5	24.0
Poultry slaughter and processing	15.5	0.2	15.7	10.1	2.4	12.5	15.4	0.3	15.8	10.3	2.2	12.5
Animal by-product processing	3.3	0.1	3.4	0.7	0.3	1.0	3.3	0.1	3.4	0.7	0.3	1.0
Fish processing	5.9	0.2	6.1	6.0	2.2	8.2	6.2	0.2	6.4	5.7	2.3	8.0

Source: Data provided by the Department of Employment, United Kingdom.

The employment trend in meat-related industries in the **United States** for 1990-94 is provided in table 1.2.12. It shows strong growth in the poultry sector and a gradual decline in meat packing. These changes reflect the trend in the United States consumption of meat and poultry products reviewed earlier. Poultry consumption overtook that of beef in 1992, due mainly to the American consumers' interest in health. Owing to the rapid expansion of the poultry industry, the unemployment rate in the north-western part of Arkansas, for example, was a mere 2.2 per cent. Moreover, the signs in Spanish in some of the major poultry processing plants in the area were an indication of an industry outgrowing the supply of local workers. [18]

Employment in the sausage and other prepared meats industries stagnated in 1990-91 but gained a little in 1992-94, particularly among production workers. Perhaps this was due partly to an effort made by many industries, including meat processing, to produce more value added products to meet diversified consumer demands, which in turn helped to protect employment.

Total employment in the fish industry in **Uruguay** based on the 30 April 1995 census was 2,500, of which 1,130 were men and 1,370 women. More than one-half (1,515) were production workers, two-thirds of whom were women. There were also 574 workers in freezing and packaging, of which 250 were women. Among 190 administrators, managers and supervisors at all levels, 66, or about one-third, were women. [19] Since data are available for 1995 only, the evolution of employment in recent years is not known.

Industry-specific statistics are not readily available, particularly in many developing countries. Our data are mostly from the industrialized countries. They show a growth in certain branches and a decline in others. These changes reflect mostly the rise and fall in production and consumption of the products concerned. A fall in the number of establishments, despite increased employment, was probably an indication of intensified competition and increasing mergers and acquisitions of firms, resulting in a growing concentration in some sectors.

[18] "American Survey: The age of the chicken", in *The Economist*, 24 Dec. 1994-6 Jan. 1995, pp. 63-64.

[19] Information was provided by the Ministry of Labour in Uruguay.

Information on gender breakdown depicted gender segregation in some of the branches. For example, the workforce in the slaughtering industry is predominantly male, which has changed very little. In poultry and fish processing, there is a strong presence of women, if not already a majority. Because of the growth of the poultry sector in many countries, the number of female workers is expected to grow even more.

Table 1.2.12. Employment in meat-related industries in the United States (in thousands)[1]

Category	Industry	1990	1991	1992	1993	1994
All employees	Meat-packing plants	137.3	136.8	135.6	135.4	133.3
	Sausages and other prepared meats	88.9	87.4	89.9	89.1	90.8
	Poultry slaughtering and processing	201.0	202.6	210.0	216.2	221.5
Production workers	Meat-packing plants	115.3	117.1	114.1	114.2	112.7
	Sausages and other prepared meats	66.3	65.9	68.1	68.1	69.7
	Poultry slaughtering and processing	181.3	181.4	187.7	193.0	196.0

[1] The figures are for July each year and are not seasonally adjusted.

Source: Bureau of Labor Statistics, US Department of Labor, *Employment and earnings* series, Washington, DC.

2. Working conditions

This section examines working conditions, mainly work hours and remuneration, and also work speed, which contributes to stress. The data below are mostly from industrialized countries for the reason already mentioned.

2.1. Work hours and remuneration

Work hours and remuneration vary among countries and sectors even within a country. They also vary according to the type of contract the worker has or one's skill level. As in other sectors, the working conditions of meat, poultry and fish processing workers in many countries are set in detail in their national or regional collective agreements. In general, an agreement specifies the nature of the worker's contract, their grades, wage rates, work hours, and various types of paid leave and social protection.

The Federal Meat Industry Award of **Australia** provides the weekly minimum wage rate for ten different grades, ranging in 1994 from the lowest of A$348 to the highest of A$393. The occupational categories under the lowest grade include unskilled workers and those who wrap, weigh, pack, seal, bundle and slice meat products. The highest graded workers include those who are required to do any slaughtering in an abattoir, and butchers who are in charge of shop and whose duties consist of management over and above the duties of general butcher for 20 hours or more per week.

This wage rate is based on the ordinary working hours not exceeding 38 hours per week, or 7.6 hours per day from Monday to Friday. However, if one is required to work on weekends or is on shift work, he/she is entitled to an overtime or shift work premium added to the fixed rate. For example, anyone who is regularly on a night shift (any shift finishing after midnight and at or before 9 a.m.) receives a premium of 30 per cent. The award also provides wage rates for young workers. In abattoirs, anyone under 17 years of age receives

50 per cent of the rate for the lowest ranking adult worker. The proportion goes up to 75 per cent of the adult rate for those in the 18-19 age bracket and 85 per cent for 19-20 year olds.

The Poultry Award of Australia stipulates the minimum weekly wage rate for six different levels. In 1994, it ranged from A$352.70 for Level 1 to A$411.00 for Level 6. Level 1 includes new employees with no experience, and Level 6 is awarded to those who are capable of performing duties at all levels.

The Fish Industry Award of Australia lists minimum weekly wage rates for different categories of workers. For example, the wages in 1994 ranged from the lowest of A$330.60 for unskilled workers (categorized as all others) to the highest of A$353.50 for salesmen and fish meal plant operators.

The conditions of work stipulated in these awards are similar. The normal working hours stipulated in the poultry and fish awards are the same as those in the meat industry award, as are premiums for overtime work, shift work, work in rooms with low temperatures, etc. However, young workers aged 18 or above in the poultry and fish industries received 100 per cent of the rate of an adult worker.

Table 2.1.1 presents average weekly earnings and work hours of full-time adult and non-managerial employees by trade and gender in the food industry in Australia for May 1993. Male meat tradespersons' average earnings were the lowest among the four categories of workers, while their female counterparts earned the highest wages for women.

If their hourly earnings are calculated based only on the information presented, the male meat tradespersons' hourly wage of A$12.5 is ranked after A$12.8 of other food tradespersons and A$12.7 of cooks. The female meat tradespersons' hourly earnings of A$ 11.9 is ranked second together with female cooks, after A$ 12.1 for female bakers and pastry cooks. In these four sectors, women were paid less than men, though the difference between bakers and pastry cooks was the narrowest.

Table 2.1.1. Average weekly earnings and hours of work of full-time adult, non-managerial employees in the food industry in Australia, by trade and gender (May 1993)

Trade	Gender	Earnings (A$)	Hours
Meat tradespersons	M	476.8	38.2
	F	462.5	38.8
Bakers and pastry cooks	M	486.4	39.7
	F	449.1	37.1
Cooks	M	498.9	39.3
	F	455.1	38.3
Other food tradespersons	M	479.5	37.4
	F	415.1	36.2

Source: Australian Bureau of Statistics: *Distribution of Composition of Employee Earnings and Hours – Australia*, Catalogue No. 6306.0, May 1993.

Table 2.1.2 gives the hourly minimum wages, as of 1 August 1994, for different categories of workers fixed in collective agreements of industries in **Belgium**. Among unskilled workers, those in meat preparation were paid the highest, followed by those in slaughtering and processing of meat, but those in meat preparation were paid the highest rate among qualified workers.

These wages are based on 38 hours of work, five days per week. Different wage rates apply to those who work five days, including Saturdays. For example, the minimum wages

for workers in slaughtering and processing of meat who work on such a schedule are BF343.30 for the unskilled worker and BF356.80 for the qualified worker.

These collective agreements also stipulate premiums concerning overtime work, night work, shift work, work in cold areas, rates for young workers, etc. In abattoirs and meat processing, for example, work on the sixth and seventh days in a week is compensated with a 25 per cent premium. Workers who are 20 years old are paid 97.5 per cent of the adult rate, and those who are younger receive 90 per cent.

In Rio Grande do Sul, **Brazil**, workers normally work eight hours per day, except in fish processing, where they may be required to work more than 8 hours per day in peak months. Their average monthly earnings are reported to be about R$200.00. In the State of Parana, meat workers normally work 40 hours per week and poultry workers 10 hours per day. Their latest average monthly earnings are reported to be R$156.22 and R$150.00, respectively, compared with R$100.00, which is the going minimum rate in the region. [20]

Table 2.1.2. Hourly minimum wage fixed in collective agreements in Belgium as of 1 August 1994, by industry and category of workers (in Belgian francs)

Industry	Category	Minimum wage
Slaughtering and processing of meat	Unskilled	330.30
	Qualified	343.00
Meat preparation	Unskilled	334.80
	Qualified	362.95
Poultry	Unskilled	308.75
	Qualified	345.00
Fish processing	Unskilled	310.90
	Qualified	348.60

Source: Data provided by the Ministry of Employment and Work, Government of Belgium.

Table 2.1.3 presents the average weekly earnings and work hours in the food and beverages sectors, as well as in the meat and poultry and fish products subsectors in **Canada** for 1989-93. Beverage workers earn the highest salary although they work the least number of hours. Meat and poultry workers are the worst paid per hour.

While food and beverage workers enjoyed a steady increase in their earnings, both meat and poultry and fish processing workers saw their earnings decline a little in 1993. In fact, the average hourly earnings of meat and poultry workers had been constantly about C$5.00 less than those of beverage workers throughout the period.

The workers in the meat, poultry and fish processing industries in **Egypt** are reported to work an average of eight hours a day, or 48 hours a week, though some work seven hours a day, or 42 hours a week. When they exceed the number of hours agreed, they are entitled to a premium of 25 per cent for day work, 50 per cent for night work and 100 per cent for days of rest. [21] Statistical data on average hours of work or earnings among them are not available.

[20] Information was provided by the FUNDACENTRO and Sindicato do Comércio Varejista de Carnes, Gêneros Alimenticios, Frutas, Verduras, Flores e Plantas de Brasilia.

[21] Information provided by the Ministry of Labour, Egypt.

Table 2.1.3. Average weekly earnings and hours of work of salaried employees in firms of all sizes in Canada, by sector and subsector (March data)

Sector/subsector	Earnings and work-hours	1989	1990	1991	1992 [1]	1993 [1]
Food	E [2]	617.25	649.81	682.56	702.17	730.68
	H [3]	38.3	38.4	38.4	38.4	38.5
Beverages	E	760.86	775.98	816.16	883.43	891.66
	H	37.0	36.8	37.5	37.1	37.5
Meat and poultry	E	602.26	625.54	637.95	684.14	669.99
	H	39.0	39.2	39.4	38.9	39.1
Fish	E	595.42	636.75	655.81	694.17	691.37
	H	38.1	38.2	38.2	37.9	38.8

[1] Hours of work under 1992 and 1993 are the average standard work-week, excluding overtime. [2] In Canadian dollars; including overtime pay. [3] Including overtime work.

Source: Ministry of Industry, Science and Technology: *Statistics Canada, Labour Division: Employment, Earnings and Hours*, Apr. issues, 1989-93, Ottawa, Canada.

The employment, the total number of work hours and the average hourly wage in the cooperative sector of the meat and poultry industries in **France** are presented in table 2.1.4. Since the data cover only the cooperative sector and the number of workers is equivalent to full-time workers, the employment figures are much smaller than those in table 1.2.4. Table 2.1.4 shows that office workers are paid more than production workers. Both office and production workers in the meat industry are paid more than their counterparts in poultry. In fact, the poultry production workers' wages declined slightly in 1994, while those of everyone else continued to rise.

Table 2.1.4. Number of workers, total work-hours and average hourly wage in the cooperative sector of the meat and poultry industries in France, by category of worker, 1991-94 (in French francs)

Year	Category of workers	Meat industry			Poultry industry		
		No. of workers [1]	Total work-hours (000 hours)	Average hourly wage	No. of workers	Total work-hours (000 hours)	Average hourly wage
1991	Office	1 295	2 626	68.23	286	580	67.19
	production	7 554	15 320	52.56	2 324	4 713	47.64
1992	Office	1 427	2 894	73.60	305	618	69.86
	production	7 788	15 793	53.88	2 408	4 883	49.38
1993	Office	1 338	2 714	74.59	290	588	71.43
	production	7 901	16 024	55.27	2 330	4 726	51.49
1994	Office	1 345	2 727	77.17	293	595	72.15
	production	8 231	16 693	55.46	2 339	4 744	51.21

[1] Number of workers is equivalent to full-time workers.

Source: Data provided by the Ministry of Agriculture, France.

Tables 2.1.5 and 2.1.6 present average weekly gross earnings and average weekly hours of work, respectively, in the meat and fish processing sectors in **Germany** by gender. Men in both sectors earn much more than their female colleagues, due partly to the fact that they work longer hours. Both men and women in the meat industry earn more than their counterparts in the fish processing sector. This difference is not due to their work hours, but

to gender. For example, the average hourly earnings of men in the meat sector in 1994 were DM22 compared with DM19.8 in fish processing. Those for women in the meat and fish sectors were DM16.7 and DM15, respectively.

How do the earnings and hours of work in the meat and fish processing sectors compare with those in other sectors in Germany? In the brewery industry, the average earnings for both men and women were higher and their work hours shorter than their respective counterparts in the meat and fish processing sectors. In the fruit and vegetable processing industries, both men and women earned more than their counterparts in the fish sector but less than those in the meat industry. The average hourly earnings of men and women in brewery in 1994 were DM26 and DM22, respectively, while those in fruits and vegetable processing were DM21.4 and DM16.3, respectively. [22] This shows that women in brewery earned as much per hour as men in meat processing.

Table 2.1.5. Average weekly gross earnings in the meat and fish processing industries in Germany, 1988-94 (in Deutsche marks)

Industry	Gender	1988	1989	1990	1991	1992	1993	1994
Slaughtering/ meat processing	Men	745	762	813	842	873	905	930
	Women	525	539	576	605	617	639	658
	Total	672	685	731	757	788	818	839
Fish processing	Men	683	718	739	750	793	837	835
	Women	450	475	503	516	541	565	584
	Total	540	570	598	614	652	687	698

Source: Data provided by Bundesministerium für Arbeit und Sozialordnung, Bonn.

Table 2.1.6. Average weekly work-hours in the meat and fish processing industries in Germany, 1988-94

Industry	Gender	1988	1989	1990	1991	1992	1993	1994
Slaughtering/ meat processing	Men	43.4	43.1	43.3	42.9	42.4	42.0	42.0
	Women	40.5	40.6	40.8	40.3	39.7	39.3	39.3
	Total	42.4	42.2	42.5	42.0	41.5	41.1	41.2
Fish processing	Men	44.8	44.9	44.7	43.1	42.9	42.8	42.2
	Women	40.3	40.9	41.1	39.9	39.2	39.1	38.9
	Total	42.0	42.5	42.5	41.2	40.8	40.8	40.4

Source: Data provided by Bundesministerium für Arbeit und Sozialordnung, Bonn.

Average monthly earnings and work hours in the livestock products and seafood processing industries in **Japan** by size of establishment and gender are presented in tables 2.1.7 and 2.1.8, respectively. Table 2.1.7 shows that men earn more than twice as much as women in both sectors regardless of the size of the establishment. Both men and women in livestock products generally earn more than their counterparts in seafood. Those employed in larger establishments are better paid than their counterparts in smaller firms.

[22] Statistics provided by *Bundesministerium für Arbeit und Socialordnung*, Germany.

Table 2.1.7. Average monthly earnings[1] in the livestock products and seafood processing industries in Japan, by size of establishment and gender (in 1,000 yen)

Industry	Size (No. of workers)	Gender	1991	1992	1993	1994
Livestock products	5 or more	M	361	381	399	411
		F	140	147	153	151
	30 or more	M	377	394	412	425
		F	147	153	160	162
Seafood	5 or more	M	313	329	330	328
		F	123	129	126	128
	30 or more	M	327	347	342	358
		F	134	134	130	133

[1] Earnings include overtime and special pay.

Source: Ministry of Labour: *Monthly Labour Survey, National Survey*, Dec. 1991-94 series, Tokyo, Japan.

Table 2.1.8 shows that men work longer hours than women in both sectors, regardless of the size of the firm. Both male and female seafood workers work longer hours than their counterparts in livestock products. While men in smaller firms tend to work longer than their counterparts in larger firms in livestock products, it was the opposite in the seafood sector.

Finally, hourly earnings of livestock products and seafood processing workers are compared with those of bakery and confectionery workers. The figures show that in 1994 male livestock workers in smaller firms earned 2,357 yen per hour as opposed to those in larger firms who earned 2,452 yen. Women in smaller and larger firms in the same sector earned 1,037 yen and 1,089 yen, respectively. In the seafood sector, men in smaller and larger firms earned 1,778 yen and 1,913 yen, respectively, as opposed to women's earnings of 886 yen and 930 yen, respectively. Men in bakery and confectionery earned 2,004 yen and 2,090 yen, respectively, in the same month, compared with women earning 1,080 yen and 1,133 yen, respectively. [23] Women employed in smaller firms in seafood processing are the lowest paid workers among the different groups compared here.

Table 2.1.8. Average monthly hours of work in the livestock products and seafood processing industries in Japan, by size of establishment and gender (including overtime work)

Industry	Size (No. of workers)	Gender	1991	1992	1993	1994
Livestock products	5 or more	M	179.7	177.1	178.2	174.4
		F	150.6	145.0	148.4	145.6
	30 or more	M	177.7	175.4	177.6	173.3
		F	148.2	144.0	149.3	148.8
Seafood	5 or more	M	191.5	188.2	188.9	184.5
		F	157.0	153.3	144.5	144.5
	30 or more	M	191.4	190.1	191.6	187.1
		F	163.3	156.4	144.4	143.0

Source: Ministry of Labour: *Monthly Labour Survey, National Survey*, Dec. 1991-94 series, Tokyo, Japan.

[23] Ministry of Labour: *Monthly Labour Survey, National Survey*, No. 551, Dec., 1994, Tokyo, Japan.

Table 2.1.9 shows the change in average hourly earnings of workers employed in the meat and fish and shellfish processing industries in **Mexico** for 1988-94. The hourly earnings rose steadily, but the employees in the meat industry are better paid than those in fish and shellfish processing, as was the case in many other countries discussed above. Moreover, the difference in their hourly earnings in this country appears to become greater. For example, fish and shellfish workers' earnings in 1989 were equivalent to 90 per cent of those of meat workers. This dropped to 83 per cent in 1992 and further to 79 per cent in 1994.

In accordance with the labour code in **Poland**, work hours must not exceed eight hours a day and 42 hours a week. Should anyone be required to work on a Sunday or any other day considered to be a day of rest, he/she should be granted a day off. When he/she is required to work overtime at night or on a Sunday or public holiday, he/she is entitled to a premium of 50 per cent for the first two hours and 100 per cent for any subsequent hours, in addition to his/her normal remuneration. [24] Data on average hours of actual work and earnings were not available.

Table 2.1.9. Average hourly earnings[1] in the meat, fish and shellfish processing industries in Mexico (in pesos)

Industry	1988	1989	1990	1991	1992	1993	1994
Meat	3 115	4 101	5 569	7 346	9 188	11 611	13 427
Fish and shellfish	2 727	3 700	5 035	6 141	7 609	n.a.	10 565

[1] Hourly earnings include wages, salaries and value of benefits. Data for 1994 are preliminary.
Source: Encuesta Industrial Mensual, provided by the Ministry of Labour, Mexico.

Average gross weekly earnings and weekly work hours of full-time manual workers in the slaughtering of animals and production of meat and by-products industry in the **United Kingdom** by gender for 1989-94 are presented in Table 2.1.10. This sector covers slaughterhouses, bacon curing and meat processing, poultry slaughter and processing and animal by-product processing (SIC code 412). It shows that men's average hourly earnings rose from £4.12 in 1989 to £5.28 in 1994, and women's from £3.07 to £4.14. In effect, women's average hourly earnings improved from 74 per cent of men's in 1989 to 78 per cent in 1994.

The data on earnings and hours of work in the bacon curing/meat processing (SIC code 4122) and poultry (4123) subsectors provided in the *New Earnings Survey* [25] show that full-time manual male workers in bacon curing/meat processing earned £4.90 per hour in 1991 and £5.58 in 1994. The earnings of their female counterparts improved from £3.86 in 1991 to £4.81 in 1994. In poultry, men's earnings increased from £4.50 to £4.81 for the same period, as opposed to women's average earnings of £3.65 recorded in 1991. Data on the latter's earnings were not available thereafter in this subsector. The above shows that those who are employed in the bacon curing/meat processing are paid slightly more while those in poultry are paid less than the average for the whole sector (SIC 412).

The above figures are now compared with the data for the whole food industry in the United Kingdom. In 1989, male food (SIC 411-423) workers worked an average of 46.9 hours and earned an average of £212.90 per week, which increased to 45.8 hours and

[24] Information provided by the Ministry of Labour and Social Policy, Poland.

[25] Published by the Department of Employment, London, UK.

£276.20 in 1994. Women's work hours and earnings changed from 42 hours and £136.50 in 1989 to 42.1 hours and £186.90 in 1994. Average hourly earnings therefore improved from £4.54 to £6.03 for men and from £3.25 to £4.44 for women for the same period. This suggests that even those who are employed in the bacon curing/meat processing sector earned less than the average for the whole food sector.

Table 2.1.10. Average gross weekly earnings and weekly work-hours of full-time manual workers in the slaughtering of animals and production of meat and by-products industry in the United Kingdom

Earnings and work-hours	Gender	1989	1991	1993	1994
Average gross weekly earnings[1]	M	188.5	212.6	230.9	240.3
	F	127.4	161.4	174.9	177.0
Average weekly work-hours[2]	M	45.7	45.0	44.9	45.5
	F	41.5	42.6	41.6	42.7

[1] Including those whose pay was affected by absence; in pounds. [2] Including overtime work; in hours.

Source: Department of Employment: *New Earnings Survey*, Part C, Analyses by Industry 1989-94 Series (London, HMSO).

Table 2.1.11 presents the average weekly work hours and weekly earnings of production and non-supervisory workers in meat-related industries in the **United States**. It shows that the employees in sausages and other prepared meats work the longest hours per week, and those in poultry the shortest hours. The former are the best paid workers, their average hourly earnings having risen from US$9.37 in 1990 to $10.14 in 1994. On the other hand, the latter's hourly earnings increased from $6.93, or 74 per cent of the former, to $7.76, or 77 per cent of the former, during the same period.

The hourly earnings of the workers in these three subsectors are now compared with those in other sectors. In food and kindred products, which covers all three subsectors discussed above, the average hourly earnings increased from US$9.66 in 1990 to $10.70 in 1994. In the beverage sector, they climbed from $13.40 to $15.10 for the same period. [26] In the meat sector, workers are paid less per hour than the average in the food sector, as are those in the United Kingdom.

This information is summarized as follows. Where information was available, men in general worked longer hours than women, but they also earned higher hourly wages. Among workers in these sectors, meat workers were usually paid more than poultry workers, while the latter normally earned more than fish- processing workers. In many countries, however, the average earnings in the food sector as a whole were higher than those in any of the three sectors. For example, the average hourly earnings in poultry in some countries were only about half of those in the beverage sector.

[26] Bureau of Labor Statistics, US Department of Labor: *Employment and Earnings*, Sep. 1991 and Oct. 1994, Washington, DC.

Table 2.1.11. Average weekly work-hours and weekly earnings of production and non-supervisory workers in the United States, by industry[1]

Industry	Average weekly hours					Average weekly earnings				
	1990	1991	1992	1993	1994	1990	1991	1992	1993	1994
Meat-packing plants	41.0	40.1	40.0	40.9	43.0	358.8	356.9	363.6	380.8	408.5
Sausages and other prepared meats	42.0	40.9	41.6	42.7	43.2	393.5	384.1	400.6	426.2	438.1
Poultry slaughtering and processing	38.5	38.9	38.1	39.1	39.7	266.8	274.6	276.2	292.5	308.1

[1] Data are for July each year and are not seasonally adjusted.
Source: Bureau of Labor Statistics, US Department of Labor: *Employment and Earnings Series*, Washington, DC.

2.2. Stress

The issues concerning working conditions cover wide-ranging aspects of work, including work hours and remuneration, discussed above. They also cover pauses, paid leaves of all types, social protection and fringe benefits. Stress associated with the work environment is an important aspect that is addressed, particularly because it can be related to occupational safety and health.

Stress occurs in different ways. Workers in modern mechanized plants may be subject to a high level of noise from various machines. For example, the noise from breaker machines in a boning room of an abattoir is around 96 dB(A), higher than the maximum allowable eight hour continuous exposure level, which is 85 dB(A). The noise from air compressors or chillers is around 105 dB(A). Since repeated exposure to noise between 75 and 85 dB(A) may also be a risk to some people,[27] it is not hard to imagine how stressful noise can be in some workplaces. Workplace noise, and measures to combat it, is discussed further in subsequent chapters.

One characteristic that the meat, poultry and fish processing sectors share is that they all handle commodities which are highly perishable and need to be processed in cold temperatures from the viewpoint of food safety. Moreover, due to increasing volumes of trade in frozen commodities, as well as the growing popularity for frozen products, an increasing number of workers are required to work in much colder temperatures. These conditions can also contribute to stress.

This is why a bonus or premium payment is provided in collective agreements in a number of countries. The Poultry Industry Award of **Australia**, for example, entitles the employee who works in temperatures between minus 15.6° C and minus 18.0°C to an additional 35 cents per hour. Those working in temperatures between minus 18.9°C and minus 23.3°C receive an additional 61 cents per hour, and those working in less than minus 23.3°C receive an additional 96 cents per hour. The going rates in the fish processing industry are similar, though employees working in less than minus 23.3°C are entitled to an additional 98 cents per hour.

In **Belgium**, on the other hand, the premium of 5 per cent and 10 per cent over the normal rate are granted to those who work in temperatures below 5°C and below minus

[27] Meat Research Corporation: *The Australian Meat Industry Occupational Health and Safety Best Practice Project: Noise control for abattoirs*, Sydney South, New South Wales, Australia.

18°C, respectively. This is provided in the collective agreements applicable to all of the meat, poultry and fish processing industries. The problem of work in cold temperatures is touched on further in the following chapter.

As in many other industries in manufacturing, the meat, poultry and fish processing sectors have become increasingly mechanized during the last two decades to improve productivity. In poultry, processing, slaughtering, defeathering, eviscerating and chilling have become largely mechanized. Deboning, for example, is still mainly done manually with a knife. Because manual operations can keep up with the speed of mechanical operations only to a certain extent, there is a growing pressure among workers related to work speed, which has become an important source of stress.

Although poultry processing was a mostly manual operation prior to 1970, the output per employee hour rose at an average annual rate of 2.9 per cent between 1963 and 1985, compared with 2.3 per cent for all manufacturing. This had been due largely to increased investment in modern production facilities. For example, a skilled worker working with a sharp knife was able to kill about 66 birds per minute. This was replaced by a mechanized machine in the 1960s which killed five birds per second. A defeathering machine can now process 160 birds per minute, and only one worker is needed to oversee the functioning of the machine and to keep the area clean. On the other hand, a halving machine, which suppressed 40 jobs, can process about 70 birds per minute. These machines have greatly contributed to raising productivity. [28]

Despite rapid mechanization, some tasks are still manually performed and work has become even more demanding. This is due to changes in the kinds of product marketed by these industries. For example, in the past the poultry industry mainly supplied whole fresh or frozen birds to the market, in addition to some cut-up parts. In response to a growing demand from retailers and consumers with different needs, however, the industry's products have been diversified extensively. They now range from prepackaged part trays, pre-formed patties, luncheon meats, frankfurters, frozen entrees, stuffed breasts, etc. Moreover, the rapid growth of fast-food restaurants, where chicken nuggets is a popular item on the menu, has created an ever-growing demand for deboned chicken meat.

The speed of all manual and mechanical operations in the **United States** is determined by the Department of Agriculture. Line speeds vary according to the weight and size of the birds being processed and the types of product produced. Since the early 1970s, the average speed from the time the birds are shackled to the conveyor, to the time they leave the plant, increased from 56 birds per minute to 70 to 90 birds per minute, depending on the inspection system used. As mechanized plants are usually highly specialized, involving a limited set of operations on a particular animal species, workers are increasingly required to perform tasks which are machine paced, repetitive and monotonous. [29]

Workers in meat-packing plants are in similar situations. A plant in **Canada** specializing in slaughtering of hogs, used to kill between 1,200 and 1,500 hogs per day, which was later increased to 2,700 per day. The speed is projected to rise to 3,500, the maximum capacity of the facility. However, the speed-up on the kill floor is reported to have been achieved without any increase in staff. Since the workers who use knives have not been replaced by machines, they are required to work much faster than before.

[28] Zinal Z. Ahmed and Mark Sieling: "Two decades of productivity growth in poultry dressing and processing," in *Monthly Labour Review*, Apr. 1987, pp. 34-39.

[29] ibid.

In another plant, in Canada, where ham is produced, the line which had run at a speed of 280 to 300 hams per hour was increased to 360 hams per hour by the mid-1980s. This gave each worker using a knife approximately nine to ten seconds to perform his task. Increased speed has not only been responsible for higher injury rates among those having to adjust to the pace of machine, but has also created an unpleasant atmosphere where workers accuse one another for being too slow or too fast. [30] Thus, improved productivity in these industries has been achieved partly at the expense of employees whose work-related stress has been increased.

Since speed is an important aspect of work conditions, it is specified in some collective agreements. For example, the Meat Industry Award of Western Australia, 1980 (Version 10/4/95), where the daily tally, or the equivalent thereof, per boner is specified as follows:

(i)	Beef-table or fixed hook boning	—	20 sides
	On rail (mechanical) side boning	—	23 sides
(ii)	Beef-table or fixed hook boning	—	40 quarters
	On rail (mechanical) quarter boning	—	46 quarters
(iii)	Sheep-table or fixed hook boning	—	72 carcasses
(iv)	Goat-table or fixed hook boning	—	72 carcasses
(v)	Vealers-table or fixed hook boning	—	50 carcasses
(vi)	Pigs weighing 77 kg and over:	—	12 carcasses with skin,
		—	15 carcasses with skin removed.

To compute the daily tally, according to the award, that one side of beef is equivalent to two-quarters of beef, five briskets to one quarter of beef, and so forth. These are relatively simple calculations, but some can be complex when keeping records. For example, seven briskets with shin are computed as equal to two-quarters of beef, five butts equal to two-quarters of beef, five briskets with shin with a portion of clod bone attached is equal to two-quarters of beef, etc.

Very little information has been obtained concerning national rules and regulations on work speed. It was mentioned earlier that it is the **United States** Department of Agriculture which regulates this matter. The Permanent Commission of International Labour Relations (COPRINT-CNI) of **Brazil** reported that the average speed from the time the chickens are shackled to the conveyor, to the time they leave the plant was about 57 to 66 per minute, though it was not indicated whether this was set by law or collective agreement. According to the Ministry of Labour of **Egypt**, work speed was determined by regulations and directives, and performance rates within each enterprise. However, no concrete information was made available. The information obtained from **Mexico** stated that speed was determined by the quantity of existing products, the perishability of meat, poultry, fish and shellfish and the supply and demand levels of the local population. However, it also stated that no specific regulations existed in this area. Perhaps due to the complexity of calculations, many collective agreements may not touch on work speed in terms of a daily tally.

It may be difficult to evaluate objectively work stress related to work speed because of the differences in an individual's capacity to adjust or respond to various work situations. However, as thresholds of noise and temperature levels considered as harmful are measured

[30] Joel Novel: "Peripheralizing core labour markets? The case of the Canadian meat packing industry", in *Work, Employment and Society*, Vol. 3, No. 2, June 1989, pp. 157-177.

scientifically, more efforts should be made to study the relationship among work speed, repetitive tasks and the extent of energy exertion required for each such movement to ensure safer working conditions. This issue has become pertinent today, particularly in the meat and poultry industries, as plants are increasingly mechanized while certain tasks remain manual, which creates a greater gap between different tasks.

3. Characteristic occupational hazards

Occupational accidents and diseases in the meat, poultry and fish processing industries in particular are reported more often than in many other sectors in manufacturing. This must be due partly to the nature of the work. In Australia, for example, the injury/disease incidence rate in the meat industry (slaughtering and processing) was 153.6 per 1,000 employees for 1992-93, as opposed to 54.2 in the poultry sector and 79.9 in the bacon, ham and smallgoods sector. The rate for the meat industry in total (including poultry, bacon and others) was 120.7, as opposed to 25.2 for all Australian industries. [31]

The safety and health situation in these industries is similar to that of Australia in many other countries. A study [32] conducted in the United States noted that the injury and illness rates in meat-packing were two to three times the all-manufacturing average. In Denmark, the Food and Allied Workers' Union (NNF) found the injury rate in the meat-packing industry unacceptable despite the efforts that had been made. It has therefore called for the joint development of a crash programme to eliminate injuries and diseases. [33] The statistics on occupational accidents and diseases in France show that in 1993 the frequency rate in the poultry industry was 62.0, as opposed to 36.1 for the total of the food manufacturing and trade industries. [34] This information confirms that employees in these industries face higher safety and health risks than workers in other industries.

More statistical data are discussed in the following section. This section briefly reviews the safety and health hazards that these industries share. This should shed some light on why workers in these sectors tend to suffer from more accidents and diseases than their counterparts in other branches in the food or other manufacturing industries.

In the course of their activities, many employees have to work in the vicinity of various safety and health hazards. These hazards are created mainly by the following elements: the particular tasks they perform, the gaps in the levels of technology employed, the nature of their work premises, and the types of raw material they handle.

First, some of the hazards are due to the workers' tasks. In the meat industry, one task is a procedure done before the animals are slaughtered. Animals are usually transported

[31] Australian Government Publishing Service: *Occupational Health and Safety Performance Overviews, Selected Industries*, Issue No. 3 — Meat products industry, Dec. 1994, Canberra.

[32] Martin Personick and Katherine Taylor-Shirley: "Profiles in safety and health: Occupational hazards of meatpacking", in *Monthly Labour Review*, Jan., 1989, pp. 3-9.

[33] IUF News Bulletin, No. 9-12/1995.

[34] "Viande de volailles, une activité à risques élevés", in *Travail et Sécurité*, Feb. 1996, No. 545, pp. 14-15.

from where they were raised to the receiving pen. During the loading and unloading of large animals, workers risk being stabbed with horns, or crushed or kicked, unless the animals are handled properly. Although fences and dividers are set up to facilitate the loading and unloading, there are always some animals, often violent ones, which obstruct these movements. In such situations, the workers' careless handling can result in serious injuries.

The actual slaughtering of large animals in most plants is now carried out mechanically or with a gun. However, handling it incorrectly can cause the animals unnecessary suffering, resulting in violent reactions that cause serious injuries to the workers. Those who perform this task must be trained thoroughly in the proper handling of live animals.

Despite an increased level of mechanization, many employees still use non-electric knives for various tasks. The knives used in fish processing come in different shapes, depending on the purpose. They range from thin, long and pointed knives for skinning and filleting, to large broad-bladed knives for splitting heavy fish such as cod, salmon, etc. In meat-packing plants, because each animal is subtly different in shape and weight, the accurate dismemberment of carcasses and precise cuts of meat still require extensive manual labour. Nearly half of these workers still perform their tasks with knives or with hand-held power tools. [35] Regardless of their shape, the knives are dangerously sharp and can easily cause serious injuries to workers who handle wet, greasy and slippery raw materials. Sharp hand tools is one of the major causes of accidents.

There are other hazardous tasks that are not confined to these sectors that can lead to accidents if not performed properly. They include various forms of manual handling or physical effort, such as lifting, lowering, pushing, pulling and carrying heavy objects. While many of these tasks are now performed with machines and forklifts in modern plants, many workers still risk injuries from these physical movements and should know the correct ways to exert force in order to minimize injuries.

The second element related to safety and health hazards concerns gaps in the levels of technology employed in the course of processing and production. As mentioned earlier, these sectors have made considerable investments to raise productivity by mechanizing some tasks. Despite modernization, certain tasks are still carried out by traditional methods.

For example, chilling, smoking, curing, slicing and packaging are now done in hours rather than days. On the other hand, since no two animals are the same size, shape and weight, the proper dismemberment of carcasses, cutting meat precisely and deboning cannot be automated. This is why approximately half the employees in the meat industry still work with knives and engage in labour-intensive work. [36]

While the productivity of defeathering and halving machines in poultry processing, for example, improves as technology advances, many workers continue to handle deboning operations with traditional knives, and are placed under increasing pressure to work as fast as the machines.

This problem is added to the specialized and monotonous nature of the tasks performed alongside the conveyor belt. In addition, workers are required to exert considerable force with certain parts of their hands and arms in repetitive movements. Having to handle slippery objects on a greasy surface with a dangerous tool also adds to their stress. All these elements contribute to creating safety hazards, particularly for repetitive strain injuries.

[35] Joel Novek, Ch.2, fn.11.

[36] ibid.

While some studies [37] report little evidence for a strong association between repetitive motions and the development of carpal tunnel syndrome, others [38] show a close correlation. Both point to a strong relationship between the age factor and the repetitive strain injuries. Thus, more studies concerning the association between work speed, the duration of employment and the nature of the tasks on the one hand, and the development of carpal tunnel syndrome on the other might help shed more light on this type of occupational disease.

Thirdly, the kinds of premise in which employees work tend to create certain safety and health hazards that often result in accidents. Because of the nature of the work or the kinds of raw material handled, many parts of the workplaces are either hot or cold, and the floor is often wet and slippery.

An increasing number of workers now work in cold areas. From the viewpoint of food safety, carcasses, poultry meat and fish must be processed in refrigerated areas where temperatures are normally kept below 16°C, while the air temperatures in the butchering premises have to be kept as close as possible to 10°C and must not fall below 8°C. [39] An increase in the trade of frozen meat and fish and a rapid rise in the production of chilled and frozen foods also make it necessary to work in cold rooms, sometimes even in freezers.

Cold rooms can cause various physical problems. Some may suffer from frostbite if they are in extreme temperatures for too long or if they are not properly covered. Others may suffer from respiratory disorders from inhaling extremely cold air. Studies have shown that accident rates also increase as temperatures fall below 19°C due to a loss of dexterity and sensitivity. [40] Another study reports that the threshold of skin temperature below which dexterity is affected is 23 to 24°C. [41]

There are other employees who work in hot areas. In pig slaughterhouses, for example, the hair on the skin is sometimes removed by a flame, after which the animals are scalded. [42] In addition, due to a rise in the demand for prepared, precooked, cooked and smoked meat, and poultry and fish products, workers are also assigned to work near ovens,

[37] See Schottland and Kirschberg et al.: "Median nerve latencies in poultry processing workers: An approach to resolving the role of industrial cumulative trauma in the development of carpal tunnel syndrome", in *Journal of Occupational Medicine*, Vol. 33, No. 5, May 1991, pp. 627-631.

[38] See Saurel-Cubizolles et al. "Douleurs péri-articulaires des membres supérieurs et conditions de travail dans les abattoirs de volailles et les conserveries", in *Société de médicine du travail, d'hygiène industrielle et d'ergonomie de l'ouest*, Sèances des 24 et 25, Oct. 1991, pp. 474-476.

[39] An excerpt from Newsletter *Bilaga 4*, a quarterly review of the Swedish National Board of Occupational Safety and Health, provided for ILO's Food and Drink Industries Committee, 1991.

[40] The Australasian Meat Industry Employees Union and the Meat Industry Federation of Australia (AMIEU & MIFA): *National Guidelines for Health and Safety in the Meat Industry*, July 1995.

[41] M. Aptel: "Baisse de la dextérité des salariés travaillant au froid", Institut National de Recherche et de Sécurité (INRS), Cahiers de notes documentaires No. 128, 3e trimestre, 1987, 369-374.

[42] ILO: *Encyclopaedia of Occupational Health and Safety*, Third edition, Vol. 1, 1983.

smokehouses and other cooking areas where temperatures become unbearably high and can cause burns, heat rash, heat exhaustion, heat stroke, etc. [43]

Another characteristic is that the floor is often wet because these industries have to clean the floor and work-tables frequently with abundant water. Blood, intestines and dejecta that are constantly produced in the course of slaughtering, eviscerating and processing activities must be removed and the premises cleaned. Cleaning is essential for the health of workers, as well as for food safety but with frequent cleaning, the wet floor often causes workers to slip and fall.

Another hazard is a greasy floor, particularly where workers debone and trim the animals and where fat falls on the floor. When workers are pressured to work faster, more fat falls on the floor. As they concentrate on their work, they may step on a piece of fat that sticks to the sole and can cause serious injuries if they fall with sharp knives in their hands. A loss of dexterity in a cold room could also increase such a risk.

Another hazardous element is noise. While many tasks still remain labour intensive, the increased level of mechanization has raised the noise level. Prolonged exposure to a high level of noise (e.g. 80 dB(A) and above for eight hours) can lead to hearing impairment, and loss of hearing can create tension. It is thus important that necessary measures be taken to protect the ears. (This hazard is found in most mechanized plants in other industries and is not particularly characteristic to the sectors concerned here.)

Finally, another safety hazard is caused by infected animals and birds. Such animals and their meat not only cause food poisoning when consumed without cooking properly, but also present a risk of zoonotic diseases to those who slaughter and process them. These diseases include leptospirosis, Q fever, brucellosis, anthrax, erysipeloid, salmonellosis, tetanus, tuberculosis, toxoplasmosis, etc.

The microorganisms that cause these diseases are usually found in urine, foetuses, faeces, vaginal discharges and milk of infected animals. They are transmitted to workers through direct or indirect contact through abraded skin, oral and nasal routes and eyes or through the inhalation of infected dust and aerosols. Employees who are more prone to such infectious diseases are those who work in yards and pens, the kill floor, offal room and skin shed. [44]

These diseases produce various symptoms. Q fever, for example, includes muscle pains, severe headache and fever, but may also cause pneumonia and liver and heart diseases. [45] Erysipeloid produces redness, irritation, a burning sensation and pain in the infected area, which can spread to the blood stream and lymph nodes. The symptoms of brucellosis are similar to those of Q fever. They include recurrent fever, headache, weakness, joint pains and loss of appetite, and give rise to symptoms such as arthritis, influenza, asthenia and spondylitis. Leptospirosis also appears in the form of headache, aching muscles, eye infection, fever, vomiting and chills, though in serious cases it may result in kidney, liver, cardiovascular and neurological complications. [46]

Toxoplasmosis can also be mistaken for influenza because of its common symptoms that include fever, muscle pain, sore throat, headache and swollen lymph nodes. In severe

[43] AMIEU & MIFA, op. cit.

[44] ibid.

[45] *Safety Line 20*, Nov. 93.

[46] S. Tomoda, Ch.1, fn.1.

cases, it can cause blindness in one or both eyes. Pregnant women in meat processing are at particular risk because it can be transmitted to the foetus, possibly resulting in brain defects or even in stillbirths. [47]

Meningitis caused by streptococcus *suis type 2* is another infectious disease transmitted from animals to man. In 1989, there were 108 cases reported worldwide, and nearly all infected persons — farmers, slaughterhouse employees, butchers, meat inspectors, etc. — had been exposed to pigs. They were contaminated mostly through wounds, bone splinters and sharp instruments such as knives, but nasal and pharyngeal lesions would have also been possible. The symptoms include fever and anorexia, followed by motor incoordination and even ataxia. Although this is a rare disease, about 50 per cent of those infected develop severe disabilities such as deafness and ataxia. [48]

As discussed above, leptospirosis is a disease usually transmitted from infected animals, but fish workers are not entirely free from this disease. A study [49] shows that there were a total of 1,508 cases of this disease reported in the British Isles between 1970 and 1992. Included were 682 farm workers, 301 water-related workers, 46 slaughterhouse employees/butchers and 26 fish processing/handling workers. Another occupational disease associated with fish and seafood processing workers is respiratory allergy, which is caused by marine antigens of animal origin that result in rhinitis and asthma. [50]

All of these occupational diseases can be prevented mostly by protecting wounds, mouth and nostrils or any body parts that come into contact, directly or indirectly, with infected animals. Vaccination against these diseases is also recommended. Preventive measures will be discussed further in Chapter 5. In any event, this brief review of certain safety and health hazards characteristic to these sectors should help everyone concerned to understand better the statistical data on occupational accidents and diseases examined in the following chapter.

4. Occupational accidents and diseases

This chapter reviews the data on occupational accidents and diseases among meat, poultry and fish processing workers, and compares them, where possible, with those among workers in other industries. Common types of accident and disease, as well as their causes are also explored. Finally, the implication on the industries of safety and health problems will be discussed from the viewpoint of cost in terms of treatment, compensation and workdays lost.

[47] Canadian Centre for Occupational Health and Safety: *Toxoplasmosis: A summary of the occupational health concern*, Aug. 1989.

[48] D. Dupas et al.: "*Streptococcus suis* Meningitis: A severe noncompensated occupational disease", in *Journal of Occupational Medicine*, Vol. 34, No. 11, Nov. 1992, pp. 1102-1105.

[49] I.R. Furguson: "Rats, fish and Weil's disease", *Safety and Health Practitioner*, Vol. 11, No. 12, Dec. 1993, pp. 12-16.

[50] N. Rosenberg and P. Gervais: "Allergie respiratoire professionnelle provoquée par les produits de la mer: Fiche d'allergologie respiratoire professionnelle No. 6", in *INRS*, 1987.

4.1. Frequency rates

In a number of countries where OSH statistics are available, accidents and diseases in the food and drink industries have been reported at higher rates than in many other sectors in manufacturing. Furthermore, OSH records on accidents and diseases among meat, poultry and fish processing workers are often found to be the poorest within the food and drink sectors. Due to the hazards characteristic of these industries, as discussed above, their workforce may be inclined to suffer from more accidents and diseases than any other groups in manufacturing.

This is confirmed by table 4.1.1, which presents the degrees of frequency and severity of occupational accidents in all sectors, the food sector and the meat industry in **Belgium** for 1989-92. The frequency rate in the meat industry is 2.4 times that of all sectors and 1.6 times that of the food industry. The degree of severity also indicates that more workdays were lost in the meat industry, due to accidents, than in other industries. A consolation may be that the frequency rate declined from 1989 to 1992 in all industries, including meat, but the rate for the meat industry was still unacceptably high.

The additional data made available by the Occupational Accidents Fund (Fonds voor Arbeidsongevallen) of Belgium give a clearer picture of the safety situation. Of all the accidents reported among meat, poultry and fish processing workers in 1994, 83 per cent of the injured were men (labourers and butchers are mostly men). The two most accident-prone groups were labourers and butchers/meat processing workers, their accidents accounting for 40 and 38 per cent, respectively, of all cases.

According to Belgian authorities,[51] there were seven, eight and 23 cases of occupational diseases reported in the meat and poultry industries in 1989, 1990 and 1992, respectively. These are compared with seven, one and one cases of diseases reported in the same years, respectively, in the fish processing industry. If the employment data in table 1.2.2 are taken as a basis for calculation, the rate per 1,000 workers in fish processing in 1989 was ten times that of meat and poultry processing (5.68 as opposed to 0.56). It was higher for fish processing also in 1990 (0.8 as opposed to 0.64), but the situation was reversed in 1992 (1.78 for meat and poultry against 0.84 for fish processing).

In **Egypt,** there was a total of 5,896 workers employed in a combined total of 32 meat, poultry and fish processing establishments in 1994, according to the information provided by the Ministry of Labour. Among them, 146 cases of accidents were reported in the same year, which resulted in a loss of 3,152 workdays. The accident rate was thus 24.8 per 1,000 workers, with an average loss of 21.6 workdays per case. Since data on time series are not available, whether or not the 1994 record was an improvement over the previous years is not known.

[51] Administration de l'Hygiene et de la Médecine du Travail, Ministère de l'Emploi et du Travail, Brussels, Belgium.

Table 4.1.1. Degree of frequency and severity of occupational accidents in all sectors, the food sector and the meat industry in Belgium, 1989-92

Sector	Degree of frequency [1]				Actual degree of severity [2]				Significant degree of severity [3]			
	1989	1990	1991	1992	1989	1990	1991	1992	1989	1990	1991	1992
All sectors	54.50	49.48	49.16	46.00	1.02	0.95	0.95	0.91	1.79	1.60	1.65	1.58
Food industry	80.40	76.14	77.08	69.04	1.40	1.38	1.33	1.22	2.14	2.02	1.92	2.02
Meat industry	146.70	124.20	127.60	111.00	2.23	1.94	1.99	1.92	4.74	2.46	3.36	3.39

[1] Degree of frequency = number of accidents × 10^6/number of employees × number of hours of exposure per year and per employee. [2] Actual degree of severity = number of calendar days lost × 1,000/number of hours of exposure per year. [3] Significant degree of severity = (number of calendar days lost + number of forfeited days) × 1,000/number of hours of exposure per year.
Source: Karen Peirens and Marc De Greef: *Meat industry, Belgium: Monitoring the work environment at sectorial level*, Project No. 149, ANPAT-NVVA, Brussels, July 1994.

Table 4.1.2 lists relevant information concerning occupational accidents in the cooperative sector of the meat and poultry industries in **France** for 1992-94. It shows that the number of serious accidents decreased, as did the frequency rate. However, the frequency rate of accidents and diseases in the poultry industry in 1993 was 1.7 times that of the total of the food manufacturing and trade industries, as mentioned in the previous section.

Table 4.1.2. Occupational accidents in the cooperative sector of the meat and poultry industries in France, 1992-94

Information concerning the industries and occupational accidents	1992	1993	1994
Average No. of employees for trimester	11 661	11 585	11 920
Total No. of hours worked (10,000 hours)	2 067.6	2 075.0	2 143.7
No. of accidents resulting in loss of workdays	2 006	1 960	1 958
Total No. of accidents	3 028	3 045	2 927
No. of serious accidents	205	193	182
No. of workdays lost ('000)	62.28	66.94	63.05
Average No. of workdays lost per case	31.05	34.15	32.20
Frequency rate	97.02	94.46	91.34
Total cost of accidents (in million Fr.)[1]	27.35	33.48	34.43
Average cost per case with lost workdays ('000 Fr.)	13.27	15.96	16.01

[1] This includes the cost of medical treatment, daily compensation and unearned revenues. Data provided by the Ministry of Agriculture, France.

Table 4.1.3 shows occupational diseases also in the cooperative sector of the meat and poultry industries in France. Contrary to the frequency rate of accidents (Table 4.1.2) which declined, the disease rate increased. If the figures for meat and poultry are combined and the employment data in table 4.1.2 are used for calculations, the disease rate increased from 7.5 to 13.1 per 1,000 workers between 1992 and 1994. This is reflected in the total cost of cases, which more than doubled.

Data on occupational accidents per 1,000 full-time workers in **Germany** show that the rate for food, drink and tobacco industries as a whole was 63.2 in 1993, one of the highest in manufacturing. The rates for other sectors were 27.7 in chemical, 25.4 in precision engineering and electronics, 41.3 in paper and printing, 34.8 in textile and leather, 32.3 in gas and water, 29.7 in trade and administrative service and 24.6 in health service. The sectors that reported a higher rate than that of the food, drink and tobacco industries were mining (67.0), quarrying, ceramic and glass (80.3), metal work (70.3), wood (112.8) and construction (120.9). [52]

[52] Hauptverband der gewerblichen Berufsgenossenschaften (HVBG): *'93 Geschäfts- und Rechnungsergebnisse der gewerblichen Berufsgenossenschaften*, Sankt Augustin, Germany, 1994.

Table 4.1.3. Occupational diseases in the cooperative sector of the meat and poultry industries in France, 1992-94

Information concerning occupational diseases	Meat			Poultry		
	1992	1993	1994	1992	1993	1994
No. of cases resulting in workdays lost	76	71	117	11	22	39
No. of serious cases	15	15	22	1	3	6
Total No. of workdays lost ('000)	7.3	8.0	11.5	1.8	2.4	3.9
Average No. of workdays lost per case	95.8	112.2	98.2	159.9	109.0	99.6
Total cost of cases with/without lost workdays ('000 Fr.)[1]	2 085.8	3 672.3	4 484.2	406.8	663.8	1 072.7
Average cost per case with lost workdays ('000 Fr.)	26.5	47.7	37.8	37.0	30.2	27.5

[1] This includes the cost of medical treatment, daily compensation and unearned revenues. Data provided by the Ministry of Agriculture, France.

The above rates can be compared with the information in table 4.1.4, which shows accident rates among meat processing workers in Germany. Although the rate per 1,000 meat workers declined remarkably from 201 to 127 between 1985 and 1994, the rate for 1993 was still as high as 145. (Even when commuting accidents are disregarded, the rates were as high as 136 and 119 for 1993 and 1994, respectively.) This was higher than the rates for any other industries reported above. This table suggests that the risk of accidents of meat workers is one of the highest among all sectoral groups.

According to the Ministry of Labour in **Hungary**, a total of 2,294 occupational accidents were reported in the meat, poultry and fish processing industries in 1988. This represented 2.9 per cent of the total accidents for all workers in the country. The number rose to 2,505 cases in 1990 (or 3.7 per cent), before declining to 1,611 cases (or 5 per cent) in 1994. Since improvement in safety records in all industries was remarkable for the period 1988-94 (nearly a 60 per cent reduction), the proportion for the meat, poultry and fish industries rose despite a decline in the actual number of cases. There were also one to three cases of fatal accidents each year. However, since more recent employment data were not made available, it is not known what percentage of the workforce in these sectors was affected by accidents.

Table 4.1.4. Workplace and commuting accidents among meat processing workers in Germany, 1985-94

Year	Reported accidents					New cases of disability				
	Workplace accidents	Commuting accidents	Total	Change over previous year (%)	Per 1,000 full-time workers	Workplace accidents	Commuting accidents	Total	Change over previous year (%)	Per 1,000 full-time workers
1985	46 138	2 191	48 329	-1.0	201	636	130	766	-10.8	3.2
1986	45 465	2 134	47 599	-1.5	195	669	158	827	+8.0	3.4
1987	43 198	2 114	45 312	-4.8	188	641	136	777	-6.1	3.2
1988	41 950	2 124	44 074	-2.7	183	639	157	796	+2.5	3.3
1989	40 220	2 236	42 456	-3.7	179	510	131	641	-19.5	2.7
1990	40 004	2 080	42 084	-0.9	179	485	100	585	-8.7	2.5
1991	51 288	2 760	54 048	+28.4	186	492	118	610	+4.3	2.1
1992	47 202	2 684	49 886	-7.7	173	479	126	605	-0.8	2.1
1993	40 958	2 607	43 565	-12·7	145	530	124	654	+8.1	2.1
1994	36 272	2 356	38 628	-11.3	127	511	135	646	-1.2	2.1

Source: Fleischerei-Berufsgenossenshaft: *Verwaltungsbericht 1994*, Mainz, Germany.

Table 4.1.5 gives the number of occupational accidents resulting in temporary and permanent incapacity and the number of workdays lost per 1,000 workers in the meat processing and retail sectors in **Italy** for 1990-94. The accident rate in meat processing declined steadily, as did the number of workdays lost, except in 1991. In the meat retail sector, too, both the rate and number of workdays lost declined after 1992. When the meat processing and retail sectors are compared, the workers in the former face a higher risk of accidents. This may be due to the fact that, in general, they are in charge of slaughtering and processing larger and heavier carcasses.

Table 4.1.5. Number of occupational accidents resulting in temporary and permanent incapacity and workdays lost due to accidents per 1,000 workers in the meat processing and meat retail sectors in Italy

Year	Meat processing [1]		Meat retail [2]	
	Accidents resulting in temporary and permanent incapacity	Workdays lost due to accidents	Accidents resulting in temporary and permanent incapacity	Workdays lost due to accidents
1990	238	3 571	170	3 082
1991	237	3 929	162	3 139
1992	223	3 552	168	3 612
1993	185	2 883	153	2 681
1994	171	2 681	140	2 132

[1] Slaughtering and processing, including poultry. [2] Retail sector including slaughtering and processing.
Source: Instituto Nazionale per l'Assicurazione contro gli infortuni sul lavoro, Italy.

Accident rates for 1990 by size of establishment in the fish processing, bread and confectionary and drink industries in **Japan** are compared in table 4.1.6. It shows that accidents among workers in smaller establishments resulted in a greater loss of workdays than those among workers in larger establishments in all sectors. In larger establishments, the rate of accidents among fish processing workers was twice as high as that among bread and confectionary workers and five times that of workers in the drink industry. In smaller establishments, workers in the drink industry had the highest rate of accidents, with fish processing workers closely behind. The table also indicates that while fish processing workers were inclined to have more accidents that required more time to heal, few resulted in permanent disability.

Table 4.1.7 presents rates of occupational accidents and diseases, permanent incapacity and death as well as workdays lost among meat and poultry and fish and shellfish processing workers in **Mexico** for 1990-94. The frequency rate for accidents and diseases for meat and poultry workers was lower than that of fish and shellfish workers in each year. Accidents and diseases among the former tended to result more often in permanent incapacity. This was also reflected in the number of workdays lost per case, which was greater for the former. The mortality rate also was higher for the former, except in 1991. The accident/disease rate for the former declined from 1990 to 1994, and that for the latter increased.

Accident rates by degree of seriousness among meat, poultry and fish processing workers in **Poland** for 1988-93 are given in table 4.1.8. It shows that most of the accidents in all these sectors were minor, though there were some fatal ones. The total accident rate in the meat industry, which was the highest among the three sectors in 1988, dropped by 27

per cent by 1993, while that for poultry increased by nearly 40 per cent for the same period. The rate for the fish industry declined by 60 per cent.

Accidents in all these sectors seemed to have become more costly in terms of the number of workdays lost per case. In the meat industry, for example, it increased from 26.7 days per accident in 1988 to 31 days in 1993. In poultry, it rose from 27 to 35.5 days between 1988 and 1990, after which it declined to 24 in 1992 but rose again to 30.3 days by 1993. In the fish industry, it climbed from 27.6 days in 1988 to as high as 42 days in 1992, after which it decreased to 38.3 days in 1993. These figures suggest that although fish processing workers may be injured less frequently than others, they stay out of work longer.

Statistics on **Sweden** concerning workplace accidents show the slaughtering sector to be the most dangerous industry. During the period 1979-90, for example, the frequency of injuries per 1,000 man-years was 169, followed by 113 in iron casting, 101 in meat preparing, 83 in sheet metal work and so on. The frequency for all industries was 29 for the same period. Despite this notoriety of the slaughtering sector, the rate decreased from 190 for the period 1979-82 to 183 for 1983-86 and finally to 135 for 1989-90, [53] or a total 30 per cent decline for 1979-90. Nevertheless, the rate was still far too high compared with other industries and much still needs to be done to improve the record.

[53] Bengt Springfeldt: *Effects of Occupational Safety Rules and Measures with Special Regard to Injuries: Advantages of Automatically Working Solutions*, Doctoral dissertation, The Royal Institute of Technology, Department of Work Science, Stockholm, Sweden, 1993.

Table 4.1.6. Degree of frequency[1] of occupational accidents in Japan, by industry and size of establishment (1990)

Industry	Establishments with 100 or more workers						Establishments with 30-99 workers					
	Total	PPD[2]	Temporary disability				Total	PPD	Temporary disability			
			Total	8 or more days lost	4-7 days lost	1-3 days lost			Total	8 or more days lost	4-7 days lost	1-3 days lost
Fish processing	4.76	0.14	4.62	3.19	0.42	1.01	7.73	–[3]	7.73	6.90	0.83	–
Bread and confectionery	2.34	0.18	2.16	1.54	0.19	0.43	5.65	–	5.65	2.75	0.48	2.42
Drinks	0.96	0.02	0.94	0.67	0.14	0.13	8.73	1.37	7.36	4.63	–	2.73

[1] Degree of frequency = No. of accidents × 1,000,000/total hours worked by all employees during the calendar year. [2] Partial permanent disability. [3] No cases of accidents were reported. No accidents resulting in death or total permanent disability were reported in these industries for the given year.
Source: Rodosho (Ministry of Labour): *Rodo Saigai Doko Chosa*, Tokyo, 1991.

Table 4.1.7. Frequency rates of occupational accidents and diseases, permanent incapacity, death and workdays lost due to temporary incapacity among meat and poultry and fish and shellfish processing workers in Mexico

Industry	Frequency rate	1990	1991	1992	1993	1994
Meat, poultry	No. of work-related accidents and diseases per 100 workers[1]	17.31	14.19	15.60	14.69	13.97
	No. of permanent incapacity per 1,000 work-related accidents/diseases	14.58	20.08	18.47	24.27	12.52
	No. of deaths per 10,000 workers	1.33	3.64	1.80	2.59	3.36
	No. of workdays lost due to temporary incapacity per work-related accident/disease	16.96	19.89	18.72	19.50	18.22
Fish, shellfish	No. of work-related accidents and diseases per 100 workers	17.44	18.86	21.29	19.14	18.82
	No. of permanent incapacity per 1,000 work-related accidents/diseases	14.04	20.39	17.69	17.25	12.24
	No. of deaths per 1,000 workers	1.02	5.20	1.11	1.27	1.35
	No. of workdays lost due to temporary incapacity per work-related accident/disease	15.87	18.93	14.63	14.21	17.70

[1] "Work-related accidents and diseases" include commuting accidents as well and they are referred to as "occupational risks" in the statistics provided by the Mexican Social Security Institute (IMSS).

Source: IMSS, COOR.S.T., SUI-55/MT-5, 1994.

Table 4.1.8. Occupational accidents in the meat, poultry and fish processing industries in Poland

Industry [1]	Types of accident and workdays lost due to incapacity	1988		1989		1990		1991		1992		1993	
		No. of accidents or workdays lost	Rate [2]	No. of accidents or workdays lost	Rate	No. of accidents or workdays lost	Rate	No. of accidents or workdays lost	Rate	No. of accidents or workdays lost	Rate	No. of accidents or workdays lost	Rate
Meat	Fatal	4	0.048	1	0.012	7	0.092	7	0.085	4	0.042	5	0.048
	Serious	35	0.4	37	0.5	78	1.0	51	0.6	59	0.6	53	0.5
	Minor	2 751	32.7	2 355	29.0	1 931	25.3	2 410	29.3	2 323	24.5	2 442	23.5
	Total	2 790	33.1	2 393	29.5	2 016	26.4	2 468	30.0	2 386	25.1	2 500	24.0
	Workdays lost	74 552	–	64 096	–	55 493	–	69 544	–	73 577	–	77 127	–
Poultry	Fatal	3	0.135	9	0.317	2	0.104	2	0.128	2	0.142	1	0.068
	Serious	3	0.1	16	0.6	33	1.7	11	0.7	15	1.1	7	0.5
	Minor	484	21.8	583	20.5	291	15.2	427	27.5	376	26.7	438	29.8
	Total	490	22.0	608	21.4	326	17.0	440	28.3	393	27.9	446	30.4
	Workdays lost	13 262	–	18 385	–	11 563	–	12 365	–	9 515	–	13 512	–
Fish	Fatal	7	0.237	3	0.135	–	–	4	0.165	5	0.206	2	0.085
	Serious	22	0.7	5	0.2	18	0.7	8	0.3	10	0.4	8	0.3
	Minor	684	23.1	452	20.5	247	9.5	302	12.4	269	11.1	211	9.0
	Total	713	24.0	460	20.9	265	10.2	314	12.9	284	11.7	221	9.4
	Workdays lost	19 699	–	12 518	–	10 249	–	10 176	–	11 917	–	8 467	–

[1] According to Classification of National Economy (KGN). [2] Per 1,000 workers. Data for 1988–89 cover accidents in state-owned and cooperative enterprises. Since 1990 data include accidents in enterprises of all forms of ownership.

Source: Central Statistical Office, Warsaw, Poland.

Table 4.1.9 presents the number of occupational injuries by severity and incidence rate per 100,000 employees in the meat and fish processing industries in the **United Kingdom**. It shows that the meat processing industry is more accident-prone. While fatal and major accident rates declined considerably in both sectors between 1989-90 and 1991-92, the rate of all accidents rose by 18 per cent in fish processing for the same period, and in the meat industry it declined. The table suggests that a continued effort is required to reduce minor accidents as well, particularly in fish industry.

Table 4.1.9. Number of occupational injuries by severity and incidence rate per 100,000 employees in the meat and fish processing industries in the United Kingdom

Industry	Year	Severity of injury				Incidence rate	
		Fatal	Major	Over 3 days	Total	Fatal and major	Grand total
Slaughtering of animals and production of meat and by-products	1989-90	–	304	3 880	4 184	331.2	4 557.7
	1990-91	2	293	3 863	4 158	n.a.	n.a.
	1991-92	1	277	3 829	4 107	292.3	4 318.6
	1992-93	2	262	3 535	3 799	n.a.	n.a.
	1993-94	–	245	3 104	3 349	n.a.	n.a.
Fish processing	1989-90	–	40	439	479	277.8	3 326.4
	1990-91	1	55	461	517	n.a.	n.a.
	1991-92	–	30	538	568	206.9	3 917.2
	1992-93	1	42	608	651	n.a.	n.a.
	1993-94	–	29	510	539	n.a.	n.a.

Source: Data provided by Health and Safety Executive, Department of Employment of the United Kingdom.

Finally, the incidence rates of occupational injuries and illnesses per 100 full-time workers in the **United States** by sector are given in table 4.1.10. Meat-packing plants are the most dangerous places to work, where workers face about twice as many safety and health risks as other workers in the meat, poultry and fish processing sectors. These rates did not improve between 1988 and 1993. The rates in poultry slaughtering and processing deteriorated gradually. The incidence rate declined slowly in most other sectors.

The information given above confirms that the workers in the meat, poultry and fish processing sectors face a much higher safety and health risk than their counterparts in many other sectors. While there has been improvement in some countries in reducing the number of accidents, the incidence rate still remains too high. Even where the rates declined, the number of workdays lost per accident increased in some cases, which suggests that the nature of some injuries had become worse. In others, the rate has risen in recent years.

Table 4.1.10. Incidence rates per 100 full-time workers of occupational injuries and illnesses that resulted in lost workdays[1] in the United States, by industry

Industry	1988	1989	1990	1992[2]	1993[2]
Meat-packing plants	19.2	18.3	20.6	23.3	19.3
Sausages and other prepared meats	13.2	12.2	12.9	11.2	11.1
Poultry slaughtering and processing	8.7	10.2	11.6	11.1	11.4
Canned and cured fish and seafoods	9.5	12.9	10.3	8.4	8.6
Fresh or frozen prepared fish	10.3	11.5	11.5	9.4	8.9
Preserved fruits and vegetables	7.9	8.3	8.6	7.9	7.1
Bakery products	7.1	6.9	7.3	6.9	6.8
Beverages	9.1	9.1	9.7	8.4	8.1
Tobacco products	3.0	3.4	3.2	2.4	2.3

[1] Number of cases which result in days away from work and days of restricted work activity. Incidence rate = (N/EH) × 200,000 where, N = No. of injuries and illnesses resulting in lost workdays, EH = total hours worked by all employees during the calendar year, 200,000 = base for 100 equivalent full-time workers (working 40 hours per week, 50 weeks per year). [2] Not including fatal injuries.

Source: Bureau of Labor Statistics, US Department of Labor: *Occupational injuries and illnesses in the United States by industry*, Series 1988-93, Washington, DC.

4.2 Common accidents and diseases

It is shown above that meat, poultry and fish processing workers are generally more inclined to have safety and health risks in the workplace than those in other industries. What types and natures of occupational accident and disease are they prone to? Better awareness of the situation should help safety and health specialists to question whether those accidents and diseases are preventable, and if so, how.

The Ministry of Labour in **Argentina** reported that types of accident among meat, poultry and fish processing workers in the order of frequency were: wounds to fingers, hands, forearms and trunk, foreign matter in the eyes, traumas and burns. No statistics on frequency, however, were made available.

Table 4.2.1 presents the ten most common injuries and diseases and the cost of compensations in the meat industry in **Queensland, Australia** for 1991-92 to 1994-95. Table 4.2.2 provides similar information on Queensland for the poultry industry. Strain/sprain was the most common injury in both sectors, followed by cuts, lacerations and bruises. This information indicates that safety risks in these sectors are similar, though industrial deafness is associated more with the meat industry. Dermatitis and Q fever were also common diseases in the meat industry.

In spite of these data, there are some positive signs. For example, the total number and cost of claims fell from 1992-93 to 1994-95. What is interesting is that the total amount of compensations related to strains/sprains dropped from 1992-93 to 1994-95, despite a rise in the number of claims. The average cost per case for all injuries and diseases also fell from 1992-93 to 1994-95. The cost per case for carpal tunnel syndrome and tendonitis rose from 1992-93 to 1993-94, then dropped remarkably in 1994-95. In fact, much improvement was made by 1994-95, but the number of strains/sprains, lacerations and cuts are still too high.

Table 4.2.1. Ten most common injuries and diseases, the number and cost of the claims and of workdays lost among meat processing workers in Queensland, Australia, 1991-92 to 1994-95

Nature of injury or disease	1991–92			1992–93			1993–94			1994–95		
	No. of claims	Cost of claims [1]	Workdays lost	No. of claims	Cost of claims	Workdays lost	No. of claims	Cost of claims	Workdays lost	No. of claims	Cost of claims	Workdays lost
Strains/sprains	460	1 201 956.07	n.a.[2]	556	1 548 459.95	n.a.	595	1 187 949.49	8 112	652	856 860.62	7 467
Lacerations	329	354 578.76	n.a.	422	501 183.61	n.a.	391	422 201.35	2 659	324	171 882.66	1 568
Cuts	403	366 307.64	n.a.	323	285 073.05	n.a.	267	173 836.84	1 374	256	148 867.34	1 265
Bruises	81	65 978.12	n.a.	84	90 524.16	n.a.	63	90 611.75	813	87	52 733.71	481
Burns	82	55 389.71	n.a.	71	77 237.29	n.a.	53	51 501.32	437	52	26 986.44	308
Industrial deafness	28	83 584.06	n.a.	33	131 529.85	n.a.	50	116 119.14	0	43	42 127.76	0
Dermatitis	35	30 058.25	n.a.	33	13 564.26	n.a.	46	24 543.31	239	43	16 970.96	183
Q fever	41	46 003.51	n.a.	66	183 205.90	n.a.	72	72 428.13	756	40	39 207.93	479
Carpal tunnel syndrome	27	122 248.85	n.a.	36	66 072.31	n.a.	29	81 555.79	565	29	60 649.90	495
Tendonitis	23	61 229.09	n.a.	59	144 353.12	n.a.	39	168 714.30	1 565	29	43 796.33	451
Total[3]	1 681	2 636 749.77	n.a.	1 886	3 507 814.35	n.a.	1 804	2 693 799.95	18 891	1 744	1 662 665.40	14 559

[1] In Australian dollars. [2] Not available. [3] Total of all injuries and diseases reported among the meat processing workers. The above data have been provided by the Division of Workers' Compensation, Department of Employment, Vocational Education, Training and Industrial Relations, Queensland, Australia.

Table 4.2.2. Eight most common injuries, the number and cost of the claims and of workdays lost in poultry abattoirs and among poultry processing workers in Queensland, Australia, 1991-92 to 1994-95

Nature of injury	1991–92			1992–93			1993–94			1994–95		
	No. of claims	Cost of claims [1]	Workdays lost	No. of claims	Cost of claims	Workdays lost	No. of claims	Cost of claims	Workday lost	No. of claims	Cost of claims	Workdays lost
Strains/sprains	201	522 611.39	n.a. [2]	210	631 285.82	n.a.	300	775 657.24	6 341	327	507 694.51	4 682
Bruises	24	12 709.61	n.a.	23	4 504.28	n.a.	30	12 587.64	107	39	30 526.53	251
Cuts	26	11 871.04	n.a.	21	25 227.47	n.a.	20	8 302.93	98	26	6 446.37	67
Lacerations	19	20 661.79	n.a.	14	3 925.15	n.a.	17	5 505.96	49	25	20 271.49	181
Carpal tunnel syndrome	7	14 106.45	n.a.	9	43 066.59	n.a.	9	96 410.93	861	16	59 974.47	544
Tendonitis	6	15 217.98	n.a.	15	24 372.95	n.a.	9	31 582.37	372	15	28 602.61	272
Fractures	6	21 518.17	n.a.	12	65 377.66	n.a.	6	28 202.21	338	12	25 628.58	289
Burns	6	1 067.97	n.a.	4	2 214.18	n.a.	11	5 529.60	33	10	4 453.25	38
Total [3]	331	668 023.37	n.a.	342	818 041.53	n.a.	438	1 071 543.35	8 773	533	773 444.28	7 247

[1] In Australian dollars. [2] Not available. [3] Total of all injuries and diseases reported among the poultry abattoir and poultry processing workers. These data were provided by the Division of Workers' Compensation, Department of Employment, Vocational Education, Training and Industrial Relations, Queensland, Australia.

In the poultry industry, the total number of claims rose steadily, though the total amount of compensations fell considerably in 1994-95. This was the trend observed in many types of injury listed. The cost per claim had risen sharply between 1991-92 and 1993-94, particularly as regards carpal tunnel syndrome, tendonitis and fracture, before it came down in 1994-95. The cases of strains/sprains are again much too high, and many other injuries are on the rise.

Table 4.2.3 lists the nature of common injuries sustained by meat (including poultry) and fish processing workers in **Belgium** in 1994. Of the 2,219 workplace accidents reported, injuries including cuts were the most common, accounting for a little over 50 per cent of all cases. Other injuries often reported included bruises/smashings, sprains/strains, minor traumas, fractures, concussions and other internal traumas. No information was provided on the cost of these cases or the number of workdays lost.

Table 4.2.3. Occupational accidents according to the nature of injury in the meat and fish industries in Belgium, 1994

Nature of injury	Frequency	Percentage
Fractures	109	4.9
Sprains/strains	182	8.2
Bruises/smashing	377	17.0
Concussions and other internal traumas	108	4.9
Amputations	6	0.3
Minor traumas	115	5.2
Dislocations	30	1.3
Burns	51	2.3
Multiple injuries of various nature	26	1.2
Other traumas	90	4.0
Other injuries including cuts	1 122	50.6
Poisoning	1	Negl.
Exposure to radiation	2	0.1
Total	2 219	100.0

Source: Fonds voor Arbeidsongevallen (FAO), Belgium.

Table 4.2.4 lists body parts that were injured in the occupational accidents reported in Table 4.2.3. Fingers, hands, ankles/feet, forearms/wrists and eyes were most frequently injured among Belgian meat and fish processing workers in 1994. This information suggests that many of the injuries in these sectors are related to hand tools used in labour-intensive processing tasks.

According to another study [54] covering the period 1989-93, cuts, sprains, twisted limbs, bruises, crushing, fractures, concussions and other internal injuries were common in

[54] Karen Peirens and Marc de Greef, Institute ANPAT — NVVA: *Monitoring the work environment at sectoral level, Meat Industry, Belgium*, Project No. 149, July 1994.

slaughterhouses. In fact, cuts occurred almost five times as often as other injuries. Less common injuries included superficial traumas, amputations and burns. Of these, most injuries occurred to fingers and hands, followed by forearms/wrists, ankles/feet and the back and chest. These findings are more or less in line with the information in table 4.2.3.

The situation in poultry slaughterhouses in the same study [55] was similar, where cuts were twice as common as sprains and twisted joints, the second most common injuries. Other injuries included concussions, internal injuries, fractures, bruises and crushing. Injuries to the fingers were the most common, or three times more common than those to the ankles and feet. Other parts which were often hurt were eyes, forearms, wrists, knees, hands, and the back and chest. Injuries frequently reported in the meat and poultry sectors in Belgium are similar to those reported in Australia, and so can be considered as typical.

The Ministry of Labour in **Brazil** reported that a majority of accidents in the meat and poultry industries were caused by hand tools, such as knives. Although no statistics on the frequency of accidents and diseases were made available, common accidents reported in the State of Rio Grande do Sul included cuts and bruises, lumbago and musculoskeletal disorders. Repetitive strains and respiratory and skin disorders were also common diseases registered. In the State of Parana, cuts resulting in losses of three to five workdays were most frequently reported, followed by amputation of the fingers.

[55] ibid.

Table 4.2.4. Occupational accidents according to body part injured in the meat and fish industries in Belgium, 1994

Body part	Frequency	Percentage
Fingers	775	34.9
Hands (excluding fingers)	247	11.1
Ankles, feet	197	8.9
Forearms, wrists	176	7.9
Eyes (including eye sockets and optic nerves)	105	4.7
Back	92	4.1
Arms and elbows	86	3.9
Knees	79	3.6
Head	66	3.0
Bones	46	2.1
Chest	46	2.1
Shoulders	42	1.9
Thighs	29	1.3
Toes	31	1.4
Neck (cervical vertebra)	10	0.4
Abdomen	12	0.5
Hips	10	0.4
Legs	6	0.3
Head and trunk and one or two legs	6	0.3
Others	158	7.1
Total	2219	100.0

Source: FAO, Belgium.

Table 4.2.5 presents the total number of cases and types of occupational disease reported for 1992-94 in the meat and poultry industries in **France**. Ailments around joints, such as tendonitis and carpal tunnel syndrome, occur frequently. The table also indicates that meat workers face a greater risk of infectious diseases than their counterparts in the poultry industry. A majority of these cases were serious enough to prevent the victims from working for some time. The table does not show whether the number of cases increased or decreased during the period.

Table 4.2.5. Number and types of occupational disease in the meat and poultry industries in France (total number of cases in 1992, 1993 and 1994)

Types of disease	Meat		Poultry	
	Lost workdays	With/without lost workdays	Lost workdays	With/without lost workdays
Ailments around joints	225	281	68	78
Brucellosis	30	40	–	–
Skin disorders due to animal origin	1	5	1	1
Allergic eczema	2	3	2	2
Disorders due to machine vibration	1	1	–	–
Noise-related disorders	–	4		2
Swine erysipelas	3	6	–	–
Psittacosis	–	–	1	1
Other diseases not diagnosed	2	2	–	–
Total	264	342	72	84

Source: *Mutualité Sociale Agricole*, Ministère de l'Agriculture, France.

The frequency rates of accidents and diseases that are commonly reported and the number of workdays lost per 100 employees in the meat industry in **Germany** for 1989-93 are presented in table 4.2.6. According to the data, meat workers face a much higher risk of occupational diseases than accidents. Joint ailments, or musculoskeletal disorders, were also the most serious problems that resulted in losses of many more workdays than from any other ailment or accident. Other diseases frequently reported included respiratory, digestive and sensory disorders, as well as circulatory problems. Based on the number of workdays lost, respiratory, sensory and circulatory disorders followed musculoskeletal disorders in terms of seriousness.

Like table 4.2.5 on **France**, table 4.2.6 does not indicate any trend concerning occupational diseases and accidents in Germany during the given period. However, another set of data in the same study, from which the information in table 4.2.6 was extracted, shows the rate of occupational diseases rising among meat workers. For example, the total number of cases of diseases increased from 879 in 1991 to 1,252 in 1992, which represented an increase from 0.3 to 0.4 per cent of employees. The number of cases increased further to 1,372 in 1993, but the percentage of employees affected was not given. The percentage of workers affected by skin diseases increased from 0.16 to 0.17 from 1991 to 1992. Cases of hearing impairment due to noise also increased from 0.01 to 0.03 per cent. Again, changes from 1992 to 1993 were not provided for any diseases.

Table 4.2.6. Number of cases of frequently reported occupational diseases and accidents and of workdays lost per 100 employees in the meat processing industry in Germany, 1989-93

Disease or accident	No. of cases per 100 employees	No. of days lost per 100 employees
Disorders in respiratory organs	35.8	1 085.1
Musculoskeletal disorders	35.8	2 243.3
Disorders in digestive organs	25.4	270.1
Injuries and poisonings	14.9	286.6
Disorders in circulatory system	13.4	740.3
Disorders in nerve system and sensory organs	10.4	753.7
Occupational accidents	11.9	371.6
Infections	4.5	110.4
Metabolic disorders	4.5	71.6
Total	186.6	6 177.6

Source: K. Kuha, P. Urban and M. Starzinger: *Sektorprofil Arbeitsumgebung: Fleischverarbeitende Industrie*, Bundesanstalt für Arbeitsschutz, Deutschland, 3 Mar. 1995.

Table 4.2.7 presents the types of occupational disease that were reported in the meat, poultry and fish processing sectors in **Hungary** for the period 1988-94. Zoonosis was the most common ailment, accounting for more than half the cases among men. If dermatitis due to purulence is also considered as a disease of animal origin, it accounted for around 90 per cent of the cases among men and for over 75 per cent among women for most of the years presented. The total number of diseases increased between 1988 and 1991, and then declined. It is not known what percentage of workers in these sectors was affected. Additional information provided by the Ministry of Labour indicates that the diseases in these sectors accounted for 5.7 per cent of occupational diseases reported for all industries in 1988. The proportion had risen to 11.4 per cent by 1991, after which it declined to 6.7 per cent in 1993. The latest figure shows that occupational diseases in these sectors in 1994 accounted for 10 per cent.

Statistical data on common types of accidents and diseases in **Italy** were not made available. However, Costa et al. [56] observed a significant excess risk of lung cancer among male workers in slaughtering and meat packing, brewing and animal food processing plants, as well as among bread bakers. Increased risks of digestive tract pathology (e.g. cirrhosis and chronic liver diseases) were also reported among male workers in farm produce conversion. However, these authors admitted that the role of alcohol consumption as a confounding factor should be considered for a more accurate evaluation of these findings.

According to the information provided by the Institute of Occupational Medicine of **Poland**, there were 39 cases of diseases reported in the meat and poultry industries and four cases in the fish processing industry in 1994. Of these, hearing impairments were most

[56] Giuseppe Costa, Fabrizio Faggiano and Susanna Lagorio (eds): *Occupational Mortality in Italy in the '80s*, ReSo Project and S.I.PRE. Project, A surveillance and cooperative project jointly funded by the Italian Ministry of Health, Rome, 1995.

common (22 cases), followed by skin disease (seven), communicable diseases (seven, including five cases of brucellosis), musculoskeletal disorders (four), bronchial asthma (two) and nerve disorders (one).

The information provided by the Epidemiology and Medical Statistics Unit (EMSU) of the Health and Safety Executive (HSE) in the **United Kingdom** shows that there was a total of 30 cases of occupational diseases reported in the meat, poultry and fish processing industries from 1986-87 to 1993-94. EMSU recognizes, however, that there was probably substantial under-reporting of cases. Of the known cases, asthma was most common (12 cases), followed by leptospirosis (eight), pathogen (eight), poisoning, as well as decompression (one each).

Findings in *Occupational Health*, published jointly by the Office of Population and Census Surveys and HSE, give additional information on health matters. For example, male mortality from lung cancer, pulmonary hypertension, chronic myocarditis, chronic bronchitis, emphysema and renal failure was significantly greater among butchers in the meat industry than in the population as a whole. Male deaths from injury by cutting and piercing instruments were also greater than the national average. It was also reported that male butchers were at a greater risk of chronic lymphatic leukaemia, while women in the same profession had a significantly higher registration of cancer of the oesophagus.

Among poultry and fish processing workers, on the other hand, mortality from lung cancer, cancer of the larynx, dementia and hernia was significantly higher among male workers, while mortality from cancer of the uterus, diabetes and alcohol-related diseases was higher among female workers than for the population as a whole. While many of these diseases may not be directly associated with jobs, it is important for safety and health specialists to take note of these findings when studying cause and effect of occupational accidents and diseases.

Incidence rates per 100,000 full-time workers of commonly reported occupational diseases in the meat sector in the **United States** for 1988-92 are presented in table 4.2.8. It also compares rates in the meat sector with those for fruits and vegetables processing and bakery sectors. The data show that the total incidence rate in the meat sector was several times greater than that of fruits and vegetables and more than ten times that of the bakery sector. This suggests that meat workers face a very high health risk. Rates increased in all the sectors during 1988-92, although the increase in the meat sector from 1990 to 1992 was relatively small.

Another observation that can be made from table 4.2.8 is that 82 per cent of the total illnesses in the meat industry was associated with repeated trauma. In fact, the incidence rate of musculoskeletal disorders rose by 80 per cent from 1988 to 1992. Skin disease, the second most frequently reported occupational illness increased by 33 per cent. Except for poisoning, the frequency of other diseases also increased, though they were a small proportion of the total. Disorders associated with repeated trauma accounted for a majority of occupational illnesses, not only in the meat industry but also in others presented.

Data on safety and health in meat, poultry and fish processing industries revealed that workers in a number of countries share similarities with regard to the types of accident; e.g. cuts, strains/sprains, bruises, fractures, and concussions. The diseases frequently reported included musculo-skeletal, respiratory, auditory and circulatory disorders, as well as zoonosis. Since many employees worldwide face similar safety and health risks, concerted international efforts may be appropriate in tackling these problems, for example, by adopting codes of practice.

Table 4.2.7. Cases of occupational diseases reported in the meat, poultry and fish processing industries in Hungary, 1988-94

Disease	1988		1989		1990		1991		1992		1993		1994	
	F	M	F	M	F	M	F	M	F	M	F	M	F	M
Poisoning by gas							2						1	8
Dermatitis due to:														
chemicals	1	1	1	1	3	4	4	2	1		1			1
purulence	8	12	10	18	11	18	7	10	5	17	2	5	8	2
fungi	1	1	2		4	1	1				1			
Musculoskeletal disorders		1												
Hearing impairment due to noise		5		2		2	1	3				2		2
Respiratory disorders				2			1				4		1	
Zoonoses	7	39	15	38	9	44	15	67	2	24	4	24	4	26
Total	17	59	28	61	27	69	31	82	8	41	12	31	14	39

Note: F = female; M = male.
Source: Ministry of Labour, Hungary.

Table 4.2.8. Incidence rates per 10,000 full-time workers of occupational illnesses in the United States, by industry and category of illness

Category of illness	Meat products[1]			Preserved fruits and vegetables			Bakery products		
	1988	1990	1992	1988	1990	1992	1988	1990	1992
Skin diseases/disorders	66.1	88.1	87.7	21.9	17.5	21.1	4.2	4.2	8.0
Dust diseases of the lungs	0.1	0.2	0.8	0.3	–[2]	–	0.6	0.4	2.4
Respiratory conditions due to toxic agents	9.2	12.8	9.4	10.0	–	6.9	1.5	1.7	1.9
Poisonings	2.7	1.4	2.1	–	–	1.1	–	0.2	0.2
Disorders due to physical agents	11.5	16.8	28.2	10.3	6.1	5.2	0.8	2.5	1.6
Disorders associated with repeated trauma	469.0	824.5	847.5	50.9	70.0	99.0	34.7	94.9	83.7
Others	11.7	16.3	18.1	7.6	4.2	10.3	1.8	4.1	7.9
Total	570.4	960.1	993.8	101.7	116.5	143.8	44.2	88.1	105.7

[1] Including meat-packing plants, sausage and other prepared meats and poultry slaughtering and processing. [2] Data not available, do not meet publication guidelines or rates less than 1.0 per 100,000 full-time workers.

Source: BLS, US Department of Labor: *Occupational injuries and illnesses in the United States by industry*, Series 1988-92, Washington, DC.

4.3 Common causes of accidents

In addition to being aware of what types of accident occur frequently, it is also important to identify why and how those accidents happen, which should help safety and health specialists to design and implement more effective preventive measures.

Table 4.3.1 lists common causes of occupational accidents reported in the meat and fish industries in **Belgium** in 1994. The most frequent cause was contact with moving objects, which accounted for one-third of the accidents. The moving objects included processing and packaging machines, conveyor belts, motorized saws, as well as vehicles such as forklifts, wagons and carts. The second most frequent cause that accounted for one-fifth of all cases was hand tools, including knives. Falls on the same level, responsible for nearly 8 per cent of cases, was a typical cause of fracture and sprains, for example. Other causes included contact with stationary objects, being trapped in or between objects, falls from a high level, and so on. These causes are straightforward enough for safety specialists to take into consideration when proposing risk control measures.

The study [57] conducted in Belgium and referred to in section 4.2 also lists causes for many of the accidents, some of which were similar though described differently. For example, common causes of workplace accidents involved knives, mechanical saws, animals during unloading and moving, carcasses falling from the hooks on the transport conveyor belt, bone splinters, bloody, greasy and wet floors, and so on. The study pointed out that these causal elements were closely associated with insufficient knowledge and ability, lack of safety awareness, forgetfulness or absent-mindedness and laxity.

Table 4.3.1. Ten most frequently reported causes of occupational accidents in the meat and fish industries in Belgium, 1994

Cause	Frequency	Percentage
Contact with moving objects	745	33.6
Handling non-motorized objects	412	18.6
Contact with stationary objects	256	11.5
Falling on the same level	174	7.8
Falling from a high level	110	5.0
Trapped in/between objects	153	6.9
Dropping objects	104	4.7
Falling objects	56	2.5
Exposures to high/low temperatures	19	0.8
Inhalation/absorption of harmful substances	15	0.7
Others	175	7.9
Total	2 219	100.0

Source: FAO, Belgium.

Causes of accidents resulting in lost workdays in the cooperative meat and poultry sector in **France** in 1994 are given in table 4.3.2. As in Belgium, non-motorized hand tools,

[57] Karen Peirens and Marc De Greef, op. cit.

such as knives, were the main cause of accidents, accounting for nearly one-third of all cases. Some other causes were also similar to those given in table 4.3.1, though they were again described or categorized differently. It is interesting to see animals listed as the second main cause of accidents in France, though they were not mentioned in the previous table. According to additional information given by the Ministry of Agriculture, however, "animals" includes carcasses as well as live animals. It is not known if the main cause of accidents (contact with moving objects) also included contact with animals.

Table 4.3.2. Causes of occupational accidents resulting in lost workdays in the cooperative meat and poultry processing industries in France, 1994 (in '000 Fr)

Cause	No. of cases	Percentage	Cost	Percentage
Non-motorized hand tools	611	31.2	4 919	15.7
Motorized hand tools	53	2.7	2 030	6.5
Stationary machines	80	4.1	1 652	5.3
Mobile machines	10	0.5	100	0.3
Vehicles	64	3.3	1 747	5.6
Animals	386	19.7	5 762	18.4
Vegetables	5	0.3	27	0.1
Constructional elements	100	5.1	2 520	8.0
Floors	127	6.5	2 174	6.9
Unknown	108	5.5	1 230	3.9
Others	414	21.1	9 196	29.3
Total	1 958	100.0	31 355	100.0

Source: Data provided by the Ministry of Agriculture, France.

Of the 1,958 accidents registered in France, 49 per cent occurred when employees were working with carcasses, while 26 per cent took place while they were handling goods, according to additional information. Building, tool and machine maintenance were also risky, accounting for 6 per cent of accidents. Accidents that occurred during "deplacements", including commuting, driving on duty and moving from one post to another, also accounted for 7.6 per cent of the cases.

The Ministry of Labour in **Hungary** reported that 25 per cent of the occupational accidents in the meat, poultry and fish processing sectors for 1988-94 were caused by falls. The next cause was sharp and piercing instruments, which accounted for 16 per cent of accidents. Forty per cent of the accidents were sustained during manual work, where 25 per cent resulted in injuries to the upper limbs. Crushing injuries also accounted for nearly one-fourth (23 per cent) of the total.

Table 4.3.3 presents the total number of major injuries [58] per 100,000 workers in the

[58] "Major injuries" include any fracture, other than to the fingers or toes; any amputation; dislocation of the shoulder, hip, knee or spine; loss of sight temporarily or permanently; penetrating injury to the eye; any injury resulting from an electric shock or electrical burn leading to unconsciousness or requiring resuscitation or admittance to hospital for more than 24 hours; any other injury leading to hypothermia or to unconsciousness, or requiring resuscitation, or requiring admittance to hospital for more than 24 hours; and loss

United Kingdom for 1989-90 by sector and cause. It shows that tripping and machinery were responsible for more than one-half of the accidents reported. Tripping was due to wet and greasy floors. Tripping and falling while holding a sharp tool could result in serious injuries.

Table 4.3.3. Reported major injuries per 100,000 workers in the United Kingdom, by sector and cause (1989-90 data)

Cause	Slaughtering	Meat processing	Poultry	Fish
Tripping	86.5	141.7	85.1	76.0
Machinery	115.4	84.2	46.1	55.0
Falls from a height	67.3	32.9	31.9	34.0
Handling	38.5	26.7	21.3	7.0
Struck by object	57.7	53.4	21.3	14.8
Struck by moving vehicle	–	16.4	3.5	6.9
Exposure to harmful substance	–	8.2	–	34.0

Source: Health and Safety Executive: *A recipe for safety*, 3/94, United Kingdom.

Available data also show that the number of accidents caused by tripping in meat processing in the United Kingdom was more than three times the general manufacturing average. The frequency of the same types of accident in the other three sectors in table 4.3.3 was also above the general manufacturing average. For accidents caused by machinery, the figure for slaughtering was more than three times the average for manufacturing, while those in other sectors were above average. Accidents by other causes that were more than three times the manufacturing average included exposure to harmful substances in the fish industry, handling and struck by objects in slaughtering, and struck by moving vehicles in meat processing. [59]

In **Uruguay**, the Ministry of Labour reported that a total of 2,905 accidents were registered in the meat and poultry industries combined, and a total of 1,664 cases were reported in fish processing. Hand tool-related accidents were the most common type among meat and poultry workers, accounting for 25 per cent of all cases. Other common causes included agents of natural origin (e.g. live animals, carcasses, bone splinters) and work environment (e.g. work surface and passageway), which accounted for 16.3 and 12 per cent of the cases, respectively. Accidents were also due to machines, transport, chemical substances, and so on. Among fish processing workers, the work environment was the most prominent cause, accounting for 15.2 per cent of cases, followed by agents of natural origin (9.8 per cent) and hand tools (9.4 per cent).

The information presented above demonstrates that a majority of cases registered as occupational accidents take place in production areas. Many are caused by tools and machines or the condition of the work environment. Many accidents could be prevented if better safety and health measures were applied and if employees became more aware of the issues that

of consciousness caused by asphyxia or by exposure to a harmful substance or biological agent. Source: *Industrial Relations Review and Report*, No. 561, June 1994 (United Kingdom).

[59] Health and Safety Executive: *A recipe for safety: Health and safety in the food industry*, 3/94, United Kingdom.

concern them. Joint efforts between management and workers is essential in identifying and reducing or eliminating workplace hazards. It is essential that everyone has access to relevant information and training on safety and health matters for the benefit of both management and employees.

4.4 The cost of occupational accidents and diseases

Although most workplace accidents and diseases in the industries concerned are not fatal, some workers are prevented from working for a period of time. The cost of accidents includes treatment for injuries and compensation for lost workdays. Furthermore, it is necessary for management to recruit and train temporary staff to replace those on sick leave. The productivity of temporary workers on certain tasks may also decline considerably from that of regular workers. These and the administrative costs of hiring temporary workers are extra costs to the employer, who is under increasing pressure to reduce labour and operational costs as the market has become highly competitive.

The cost of accidents could involve much more. For example, when serious cases are reported, it could involve legal penalties to the extent that the entire production may be forced to stop for a period of time. Or it could result in civil suits, after which the employer's liability insurance premium would increase. Poor safety records could also adversely affect the consumers' image of the enterprise, which could result in a decline in overall sales. Thus, some suggest that the cost of accidents could represent as much as 37 per cent of the profits, 5 per cent of the operating costs and 36 times the insured cost. [60]

Tables 4.2.1 and 4.2.2 concerning the meat and poultry sectors in Queensland, **Australia** show the total cost and the cost of claims by nature of injury or disease for 1991-92 to 1994-95. In the meat industry, the total compensation had reached more than A$3.5 million in 1992-93, and then dropped. In the poultry industry, it had increased to over A$1 million, after which it declined. The declines in the number of cases and the cost of claims were the results of a genuine commitment in some states, including Queensland, to address occupational safety and health problems. [61]

In Victoria (Australia) a total of 12,709 claims related to accidents and diseases in the meat, poultry and fish processing industries were compensated between January 1988 and May 1995. Of these claims, 9 per cent required payments of over A$20,000 per case. Compensation payments before July 1993 totalled over A$94 million with nearly 630,000 days compensated, while compensation payments after July 1993 totalled almost A$5.5 million with more than 36,000 days compensated. Although the number of claims nearly doubled from 1987-88 to 1988-89 (from 1,280 to 2,250), peaking in 1990-91 (2,498), it dropped sharply to 847 by 1993-94. [62]

The data for Australia as a whole indicated that the meat industry paid A$60.36 million in 1986-87 alone as workers' compensation. In addition, other indirect costs, including replacement and training of staff, internal management systems for compensation and

[60] Health and Safety Executive: *A recipe for safety: Health and safety in the food industry*, 3/94, United Kingdom.

[61] David Caple and associates, Robert Barrow Risk Management and Australian Meat and Livestock Research and Development Corporation: *Occupational Health and Safety in the Australian Meat Processing Industry*, Final Report, Apr., 1990.

[62] Information was provided by the Government of Australia.

rehabilitation cases, were required. In effect, the total cost of direct compensation and indirect expenses of accidents and diseases that year was estimated to be over A$300 million. [63] The cost of occupational accidents and diseases, which skyrocketed in the late 1980s, must have been responsible for the special efforts made in the early 1990s in Queensland and elsewhere in the country to reduce the number of accidents and diseases and related costs.

Table 4.4.1 presents the consequences of workplace accidents reported in **Belgium** in 1994. While nearly one-half of the accidents were minor, more than one-half resulted in lost workdays, of which 56 per cent ended in losses of 7 to 29 workdays per case, and 12 per cent required 30 to 90 days or more away from work. Among the cases that resulted in permanent partial incapacity, three-fourths of them resulted in minor incapacities, while 6.5 per cent suffered incapacities of 25 per cent or more. Two employees sustained mortal injuries. The total cost of these injuries, incapacities and deaths was not available, but the total number of workdays lost amounted to 21,284, or an average of 11 days per case. [64] When these figures and both direct and indirect expenses are considered, these accidents can be costly.

Table 4.4.1. Consequences of workplace accidents in the meat and fish industries in Belgium, 1994

Consequence of accidents	Frequency	Percentage
Minor accidents	996	44.9
Lost workdays:	1 129	50.9
Less than 3 days	109	4.9
3-6 days	250	11.3
7-29 days	635	28.6
30-90 days	116	5.2
More than 90 days	19	0.9
Permanent partial incapacity:	92	4.1
Less than 10% incapacity	75	3.4
10-20% incapacity	11	0.5
25-49% incapacity	5	0.2
50-100% incapacity	1	Negl.
Deaths	2	0.1
Total	2 219	100.0

Source: Fonds voor Arbeidsongevallen (FAO), Belgium.

The direct costs of occupational accidents and diseases in the cooperative sector of the meat and poultry industries in **France** are shown above in tables 4.1.2 and 4.1.3. The total number of serious accidents declined steadily from 1992 to 1994, while the number of workdays lost rose, particularly from 1992 to 1993. Despite the decline in the number of serious accidents, the total cost of accidents increased steadily between 1992 and 1994, as did the average cost per case that resulted in loss of workdays. Regarding occupational disease, the cost per case declined steadily from 1992 to 1994 in the poultry industry, while that in the meat industry increased by 80 per cent from 1992 to 1993, and then declined by 20 per cent.

[63] David Caple, et al., op. cit.

[64] Data provided by Fonds voor Arbeidsongevallen (FAO), Belgium.

These tables show the difference in the cost per accident and disease involving loss of workdays. The cost per case of disease in the meat industry in 1992 was double that of an accident in the meat and poultry industries combined. The cost of a disease in the poultry industry in 1992 was 2.8 times that of an accident in these industries combined. Despite a decline in 1994, the average cost per case of disease in both these industries remained still much higher than that of an accident. The fact that the number of cases of disease that resulted in lost workdays increased in both the meat and poultry industries between 1992 and 1994 is a great concern for all parties involved from the viewpoint of productivity, labour cost and safety and health.

In **Hungary**, the total number of workdays compensated as sick leave due to accidents and diseases in the meat, poultry and fish processing sectors increased from 120,225 days in 1988 to 161,529 days in 1992, and declined to 122,993 days in 1994. These figures represented losses of 50.7 workdays per case of accidents and diseases combined in 1988. It rose to 76 days per case in 1993, and slightly down to 74 days in 1994. These figures suggest that safety and health problems must have also become costly in recent years.

Tables 4.1.5 and 4.1.8 presenting information on occupational accidents in **Italy** and **Poland**, respectively, also indicate the extent of the total cost of injuries in terms of workdays lost. Compensation for these days alone must have been considerable, apart from the other direct and indirect costs involved.

Consequences of occupational accidents and diseases per 1,000 workers in the meat and poultry and fish and shellfish processing industries in **Mexico** are shown in table 4.4.2. Although these data do not provide the total cost, one can estimate its magnitude based on the number of workdays lost and the number of cases resulting in permanent incapacity as well as in deaths.

Finally, table 4.4.3 presents the total number of workdays lost per 100 full-time workers due to injuries and illnesses in several sectors in the **United States**. The first five sectors in this list are focused on in this study, while the last four sectors in the food, drink and tobacco industries are presented for comparison. Although no figures on the amount of compensation for the accidents and diseases are provided, the data on lost workdays alone give an idea of the magnitude of the total cost of safety and health problems.

Table 4.4.3 shows that the workers in meat-packing plants face higher safety and health risks in the workplace than any other groups presented. Tobacco workers, on the other hand, enjoy the safest work environment. The workers focused on in this study generally suffer from injuries and illnesses that keep them out of work longer than other groups in the food, drink and tobacco industries.

Table 4.4.2. Consequences of occupational accidents and diseases per 1,000 workers in the meat, poultry, fish and shellfish processing industries in Mexico

Industry	Consequences (Nos.)	1990	1991	1992	1993	1994
Meat/poultry	Workdays lost due to temporary incapacity	2 937	2 822	2 920	2 865	2 546
	Cases of permanent incapacity	2.5	2.8	2.9	3.6	1.7
	Deaths	0.13	0.36	0.18	0.26	0.34
Fish/shellfish	Workdays lost due to temporary incapacity	2 766	3 571	3 114	2 720	3 330
	Cases of permanent incapacity	2.4	3.8	3.8	3.3	2.3
	Deaths	0.10	0.52	0.11	0.13	0.14

Source: These figures have been calculated based on statistics given in IMSS, COORD. S.T., SUI-55/MT-5, 1994.

Table 4.4.3 also shows that the number of workdays lost increased between 1988 and 1990 in most sectors. It increased by 21 per cent in meat-packing plants and by 41 per cent in poultry slaughtering and processing. The increase in the number of workdays lost suggests a considerable rise in the financial burden of the industries, which was associated with both direct and indirect costs of occupational accidents and diseases.

Table 4.4.3. Number of workdays lost, per 100 full-time workers, due to occupational injuries and illnesses in the United States, by industry

Industry	1988	1989	1990
Meat-packing plants	357.0	358.7	431.8
Sausages and other prepared meats	239.5	233.5	265.7
Poultry slaughtering/processing	159.4	173.2	225.2
Canned/cured fish and seafoods	99.1	144.4	122.9
Fresh/frozen prepared fish	164.6	156.5	186.7
Preserved fruits/vegetables	129.1	148.8	161.8
Bakery products	155.2	153.9	168.0
Beverages	163.7	165.1	186.3
Tobacco products	53.9	64.2	62.3

Source: BLS, US Department of Labor: *Occupational injuries and illnesses in the United States by industry*, Series 1988-90, Washington, DC.

The information reviewed presents a picture of occupational accidents and diseases, which is particularly notable in the meat and poultry industries where the cost of compensation has risen in recent years. This situation is adversely affecting the productivity of these industries. In view of this trend, all parties need to realize the urgent need to cooperate in order to improve their work environment and work practices and their safety and health records.

5. Prevention

Compiling data on accidents and diseases that occur in the workplace is the first step in understanding the types of safety and health problem in these sectors. Once data are analyzed regarding common types and causes of injuries and diseases, safety and health risks can be assessed at enterprise and sectoral levels. This should then lead to measures to eliminate or minimize those risks, which should result in reduced accidents and diseases. The measures must be constantly monitored and revised, as needed, according to changes in the work environment, in machinery and tools and in work methods. For the measures to be effective, every employee needs to be aware of those risks and be trained for safe conduct and use of tools and machinery.

5.1 Preventive measures

5.1.1 Personal protective equipment

Utilizing personal protective equipment (PPE) is a practical way to control safety and health risks in the workplace. PPE does not eliminate risks and hazards, but it can protect a worker from various kinds of injury and disease. PPE may include footwear, headgear, gloves, apron, clothes or ear plugs, depending on the kinds of risk an employee is exposed to.

For example, boots with non-slip soles can reduce injuries due to slips and falls on wet and greasy floors. The same gear with an adequate upper can also protect feet from cuts from a knife or from burns due to chemicals and hot water used for cleaning and disinfecting the floor. Ear plugs can protect those who are constantly exposed to more than 85 dB(A) of noise. Since hearing impairment normally develops over a long period of time, many are not aware of the need to protect themselves. It is essential that the employees understand the consequences of long hours of exposure to noise without any protection.

Arm guards and mesh gloves and aprons can prevent cuts and stab wounds to the fingers, hands, arms and abdomen. Despite the availability of these items, many cutters and deboners are reported not to use them because such pieces are often considered too heavy and cumbersome and may affect dexterity. Many believe that this hurts their piece-rate income. However, records show that the number of injuries decrease and sick leave is reduced if PPE is worn regularly. A study also indicated that the five-finger protective glove is much more effective than the three-finger glove which can be slippery. [65] Thus, it is important to make PPE available to employees and to make it a rule for them to use it.

Other items of PPE include protective clothes, gloves, moisture-resistant aprons, safety helmets, goggles, face shields, masks and so on. Protective clothes and insulated boots keep workers in cold rooms warm and their circulatory systems in order. Rubber gloves can prevent workers from contracting infectious disease of animal origin or from dermatitis due to the chemicals they handle. Goggles and face shields can protect workers from intoxication

[65] Bengt Springfeldt: *Cutting of Meat: Attitudes to safety problems*, The Royal Institute of Technology, Department of Work Science, Stockholm, 1993.

and poisoning when handling chemical substances or from injuries to sensory organs. Surgical masks are useful in preventing the workers from inhaling substances that may lead to respiratory disorders, or from contracting zoonosis.

The essential point of all these PPE items is that employees be able to assess the safety and health risks in their own work environment and to use the most appropriate PPE regularly for their own protection. Maintenance of PPE from a safety and health point of view also needs to be ensured.

5.1.2 Machine guarding and engineering control

It was shown earlier that machinery is the cause of many accidents. Jammed, crushed or cut hands or fingers are common injuries of machinery because workers are often exposed to dangerous machine parts, such as blades, worms, saws and needles, of machines like bandsaws, mincers, mixers, slicers and cutters.

To prevent accidents, operators must be well trained in handling machinery and follow all safety guidelines operating the machines. Appropriate machine guards, available from the manufacturer need to be properly installed and maintained. Before starting the machines, operators should ensure that they are wearing the appropriate protective equipment and take care that their clothes, hair or accessories not be caught in the machinery. All machines should also be equipped with control buttons with clear indications of "start" and "stop" to prevent unintended operation.

Guards and control buttons on machinery are some examples of engineering control for preventing accidents. Another example is dealing with the problem of noise, for instance, by isolating the source of noise rather than having workers wear ear plugs or ear muffs. Noise can be isolated by enclosing machines or equipment in a soundproof area or by adding mufflers and silencers to specific machine parts. The noise caused by the movement of metal hooks can be reduced, for example, by using plastic bumpers, coating the rail with nylon or replacing metal hooks with durable plastic ones.

There are many other areas for which engineering control can be used for safety and health purposes. For employees suffering from circulatory problems, an isolation technique is used. A refrigerated area is localized by enclosing chilled hoppers or conveyors. This way the chilled area is kept as small as possible.

Modification of machines, tools and workstations by engineering techniques can be very effective in coping with safety and health risks. While engineers design these techniques with safety in mind, suggestions from workers based on their experience can contribute to their improvement. Since many accidents are also reported during machinery maintenance, engineers could design machines that can be maintained and cleaned safely. Reassembling the machinery after cleaning it should not require a great effort. The input of both management and workers is useful and necessary in making improvements through engineering control.

5.1.3 Ergonomics

As shown in the statistics presented earlier, many meat and poultry processing workers suffer from musculoskeletal disorders. Indeed, it is sometimes difficult to prove the direct relationship between work and this problem. It could be due to the habit of moving the body in an awkward manner or it could be related to activities outside work. However, the number of such cases compensated as occupational diseases has increased and the amount of compensation per case has also risen considerably in some countries.

One of the causes of musculoskeletal disorders is that cutters and deboners handle greasy and slippery chunks of meat with repetitive motions. The nature of their tasks requires force, which leads to overuse of certain muscles and joints, and can result in temporary or permanent disability of specific parts of the body. Standing for long hours and working in a fixed posture is another cause of this problem. In addition, work in cold temperatures aggravates blood circulation, which creates the condition for this problem to develop. As musculoskeletal injuries and diseases draw increasing attention in many countries, various attempts are being made to reduce the risks through ergonomics.

The ergonomic approach focuses on making work and the work environment fit the workers, rather than making the worker fit them, to achieve maximum efficiency in a comfortable position. For example, workstations should be designed to meet the needs of the worker who performs certain tasks through repeated motions in the same position. This requires that the height, shape or space of the workstation fit the needs of the worker in order for him/her to work with the least amount of strain.

Since different workers may perform different tasks at the same workstation at different times, and since workers' heights vary, the station must be adjustable to accommodate their needs. The optimum height of the workstation varies depending on the task performed, but having the workstation about 8 cm below the elbow is considered the best height for simple, light manual tasks.

Ergonomics could also be applied to tools such as knives and power saws. For example, the handle of a knife should be designed to accommodate the shape of the hand and fingers so that the worker can grip it better, resulting in an efficient performance and with the least strain in any of his/her body parts. A heavy powered tool should be suspended with an adjustable cord so that the user does not have to support its weight while performing a task.

Lifting and carrying heavy loads also results in many musculoskeletal injuries. Such tasks should be done with a forklift or a mechanical aid to minimize risks. If this is not feasible, workers should at least be trained in the safer handling of heavy objects. The correct posture when loading and unloading heavy objects would be helpful. Such loads can also be handled by two persons. A better storing arrangement, such as installed racks and shelves, from which workers lift or put down heavy objects, would also reduce hazards.

Ergonomic improvement does not have to be costly. Even simple suggestions based on workers' daily experiences can protect them while improving their work efficiency. It is therefore advisable for employees to be trained in assessing various ergonomic risks and hazards around them, and in dealing with them with other co-workers by sharing ideas and better work methods.

5.1.4 Work environment and good housekeeping

In view of the kinds of accident that are frequently reported, management and workers must pay more attention to the work environment and good housekeeping. For example, slipping, tripping and falling on wet and greasy floors, particularly when knives are involved, can result in serious injuries. While boots with rubber soles can reduce slips, these accidents can also be prevented by installing a non-skid floor material or rubberized cushioned floor mats at all workstations. Spillages of greasy substances should be cleaned immediately, and large warning notices should be placed where accidents are likely to occur. Installing guard rails in uneven or slanted areas would also reduce falling and slipping.

There are many accidents related to vehicles, such as forklifts, inside the plant that can be reduced if pedestrians' and vehicles' passageways are clearly marked on the floor and if

internal traffic rules are strictly observed. Some workers also strike their heads or other body parts against protruding parts of the building or facilities. Such areas can be cordoned off or clearly marked with a large hanging sign. A swinging door presents a high risk of accidents when the other side is not visible. A window could be installed on the upper part of the door or the whole door could be made of translucent material.

A freezer door must be kept closed in order for frozen materials to remain at a certain temperature, but there is a danger of being trapped in a sub-zero room. Most freezers are equipped with an inside lever. If the lever breaks however, there is still the risk of being trapped. An alarm system that can be triggered from the inside should be installed.

In the layout of workstations where workers using knives or other dangerous tools, there should be enough space for each employee to work safely. For example, according to the safety rules of Poland provided by its Labour Ministry, each fish processing worker should have 5 m^2 of working space and that the distance between workers should not be less than 1 meter. In its poultry processing plants also, space of at least 1.2 metres on both sides of the conveyor belt is provided.

Keeping the storage well organized is fundamental to good housekeeping. Tools and supplies should be placed so that anyone can find easily whatever he/she is looking for. Dangerous substances need to be clearly labelled and safely positioned to prevent poisoning accidents, while heavy materials should be stored on middle shelves to minimize back strains. Knives need to be sharpened regularly by trained individuals so that cutters will not have to exert unnecessary force, which would help prevent musculoskeletal injuries and diseases.

Adequate lighting throughout the workplace is essential. Poor lighting and glare can lead to eye strain and reduced productivity and is also likely to cause accidents. Though regulations vary among countries, lighting of 300 lux or more is generally recommended for precision work, 150 lux or more for normal work and 70 lux or more for rough work. Storage rooms and traffic routes need to be well lit to prevent traffic accidents and also errors in identifying materials. Electrical wirings and outlets must be regularly checked and maintained in a safe condition to reduce risks of electrocution and short circuiting.

5.1.5 Administrative control

Another means of reducing risks of occupational accidents and diseases is job rotation by administrative control. This is particularly useful for those engaged in repetitive work or who are exposed to extreme temperatures or hazardous substances. For example, rather than having workers perform repetitive tasks every day, it is ergonomically advisable to change jobs so that they can work in different postures, using different parts of their bodies, and thus be less likely to develop musculoskeletal disorders. Manual loading and unloading of heavy objects should not be done by one person.

Difficulties in job rotation is that certain tasks require different qualifications. Different pay rates for different tasks make it difficult to apply this system as many workers prefer to keep their higher-paying jobs even if it means repetitive work. Some might fear an overall decline in productivity as work speed is bound to drop with rotations. Thus, management must consider both positive and negative points and difficulties when introducing job rotation.

Providing short and frequent pauses to those who perform repetitive tasks, rather than one long break in the morning and afternoon, may be effective in preventing musculoskeletal strains. Engaging workers in stretching and light exercise during these pauses is even more advisable. There must be enough space for movement, and advice is needed as to what kind

of stretching would be useful for those who perform physically stressful tasks or for those who use the same body parts excessively.

Closely related to administrative control of pauses and rest periods is the control of work speed. Many meat and poultry processing workers perform repetitive tasks on the conveyor belt, where they are required to work at the same speed as the conveyor belt, which places excessive pressure on those who are unable to maintain the pace. The speed in these industries has been increased considerably over the years to achieve higher productivity. However, excessive work speed often results in repetitive strains of arms and joints. Management in consultation with workers and supported by evidence needs to establish the speed beyond which the quality of products tends to decline and injuries occur.

Administrative control is also needed at recruitment. Pre-employment medical examinations are conducted in the meat and poultry industries of many countries to comply with the requirements of the meat-importing countries. Some plants also conduct more sophisticated check-ups, involving audiometric and musculoskeletal screening assessments to avoid recruiting or assigning certain tasks to those who are prone to disorders related to work and the work environment.

Accidents often increase with age. The data provided by the Ministry of Japan show that the accident rate for every 1,000 workers of 50 or older in 1989 was 7.7, as compared with 3.4 for the 20 to 29 age bracket. [66] Management can arrange work so that older workers are assigned to tasks involving less risk. In this way overall safety records can be improved. Administrative control can be combined with other measures to aim at ever higher safety standards.

5.1.6 Measures against zoonosis

Employees are at risk of contracting different kinds of zoonotic disease unless they observe safety measures. The risk is high among those in slaughtering and processing of beef and other livestock, as well as poultry, that carry the disease.

There have also been cases of a new disease called *bovine spongiform encephalopathy* (BSE), commonly referred to as "mad-cow disease". The cases of BSE which have been reported mainly in Europe, pushed the beef industry and meat consumers into a state of panic. This was due mainly to the fact that there is little scientifically reliable information available as to how this disease is contracted and what can be done to avoid it.

As regards the known diseases, there are some established measures which need to be followed. Immunization is recommended against Q fever and medical screening of both employees and livestock is essential. Employees must maintain high standards of personal hygiene, ranging from clean clothes and hands to proper and immediate treatment of cuts, wounds and skin lesions. In order for employees to maintain high standards of personal hygiene, they must be provided with adequate facilities that include basins for hand washing and shower rooms.

Another important factor to prevent zoonosis is that plants must be designed so that yards, slaughtering areas and skin sheds can be cleaned and drained to maintain hygiene. The use of high-pressure water should be minimized to reduce the generation of aerosols which could contain harmful micro-organisms.

[66] Ministry of Labour: *Anzen no shihyou*, Tokyo, 1991.

Finally, appropriate personal protective equipment over the mouth, eyes and hands can guard against inhalation and contamination of disease-carrying micro-organisms. If these measures are strictly observed at all times, zoonotic diseases will be reduced.

5.2 Safety and health committees

Preventive measures against occupational accidents and diseases reviewed above show the importance of cooperation between management and workers. While engineers, ergonomic specialists and administrators can contribute to improving work environment and organization, employees may be in a better position to point out occupational hazards based on their daily work experience. Because of the effectiveness of collaborative work in the area of occupational safety and health (OSH), an increasing number of countries now require by law that workers' safety and health (SH) representatives be appointed, a bipartite SH committee be set up and a safety officer be appointed in companies employing more than a certain number of workers.

The minimum number of workers for which this law is applicable varies between countries and states. In Australia, the Industrial Health, Safety and Welfare Act, 1977 of Tasmania elects workers' safety representatives where more than ten people are employed. The Occupational Health and Safety Act, 1983 of New South Wales, on the other hand, makes it obligatory for a workplace with more than 20 persons to form an SH committee. [67] Among the members of the European Union, the minimum number of employees in a workplace in order for a SH committee to be established ranges from 20 in Denmark to 100 in Spain. [68]

For any SH committee to be effective, it has to have a serious commitment from management at all levels, particularly from senior management. It should also have the enthusiastic participation of employees through their representatives. Workers' representatives, who should make up half of the committee members, can be self-elected or appointed by management. They should be trained in the concept and practice of integrated OSH management approaches and have broad support from their fellow workers.

Responsibilities generally include the following tasks: (1) to inspect the workplace in a manner determined by the committee at agreed intervals, after giving reasonable notice to the employer or immediately in the event of an accident; (2) to accompany a government inspector during an inspection; (3) to be present at an interview between an employee and an inspector or employer; (4) to have access to the employer's information relating to actual and potential hazards and the health and safety of employees; (5) to be consulted on or provided with details of proposed changes to the workplace that may affect the safety, health and welfare of the workers; (6) to receive information from an inspector about his/her observations and any action proposed by the inspector; (7) to recommend training to

[67] The Australasian Meat Industry Employees' Union and the Meat Industry Federation of Australia: *National Guidelines for Health and Safety in the Meat Industry*, Australia (the place of publication not mentioned), July 1995.

[68] European Foundation for the Improvement of Living and Working Conditions: *Working Conditions in the European Meat Processing Industry*, Luxembourg, 1995.

overcome OSH hazards; and (8) to cease work when there is an immediate threat to safety and health, after consultation with the employer. [69]

It is important that workers' representatives are trusted by their fellow workers and are knowledgeable about OSH issues. They should also have communication skills, with which they can convey relevant information and train the workers in best practices. The skills are also useful in channelling their colleagues' contribution regarding risk assessment and identification into proposals of corrective measures.

On the other hand, a plant-level SH committee generally has the following functions: (1) to create and maintain awareness and interest in safety and health in the workplace; (2) to facilitate cooperation between employer and employee; (3) to develop and distribute standards, rules and procedures on safety and health; (4) review the circumstances surrounding work injuries, illnesses and occurrences; and (5) to make recommendations to the employer on safety and health matters.

In addition to a plant-level safety and health committee, many countries also require by law a safety and health (SH) officer. In Queensland, Australia, for example, the law provides that a workplace with more than 30 employees should appoint a qualified person for this task. The duties of an SH officer usually include, in addition to being on the safety and health committee, inspecting the workplace and advising the employer on the overall condition of safety and health, recording and investigating all occupational injuries and diseases and assisting government inspectors in their duties. An SH officer should therefore have a thorough knowledge of law and regulations related to safety and health in the particular industry, safety and health practices in the workplace and in accident investigation procedures. [70]

Employers in Japan are required by the Occupational Safety and Health Act of 1972, revised in 1990, to appoint safety officers in workplaces under certain conditions. The conditions vary by sector and according to other factors. In construction sites and organic chemical and petroleum products manufacturing plants, at least one full-time safety officer is appointed if the number of employees exceeds 300. In the meat, poultry and fish processing sectors, the requirement is imposed on plants employing 1,000 or more staff, as in the case of most manufacturing industries. A safety officer must have a university degree in science and a minimum of five years of practical experience in occupational safety.

Employers in Japan are also obligated to appoint health and medical officers. The number of health officers required depends on the size of the workforce. In the food and drink industries, at least one health officer must be appointed in a plant employing 50 to 199 workers, two officers in a plant with 200 to 499 workers and six officers for more than 3,000 workers. At least one medical officer must be regularly assigned in a plant where 500 regular workers are employed and where they work in extremely cold temperatures, handle cold objects and are at risk of infection from micro-organisms. (This includes meat, poultry and fish processing industries.) [71]

[69] The Australasian Meat Industry Employees' Union and the Meat Industry Federation of Australia, op. cit.

[70] The Australasian Meat Industry Employees' Union et al.: *Guide for the beef and small stock processing industry*, Australia (the date and the place of publication are not indicated).

[71] Rodosho Anzen Eisei Bu: *Rodo Anzen Eisei Kisoku*, Chuo Rodo Saigai Boshi Kyokai, 1991.

In order to assist the plant-level SH structures to perform their functions, a bipartite mechanism at the industry level in some countries has produced, or is in the process of producing, a self-audit checklist for the workplace safety and health assessment. The checklist contains columns that list issues of concern (e.g. "The safety policy has been communicated to workers".), their statuses (e.g. "yes" or "no"), corrective actions and/or comments specified and the date when corrective actions were completed.

This type of checklist should help everyone to perform their duties in steps and follow-up until satisfactory results are obtained. The surest way to make the workplace safe is to have every employee raise his/her SH awareness through information dissemination and appropriate training.

5.3 Information dissemination and training regarding workplace hazards

Employers are generally required by law to ensure, so far as is reasonably practicable, the safety and health of their employees. They are responsible for providing their staff with a safe workplace, safe machinery, safe work systems, as well as adequate information, instruction, training and supervision concerning OSH.

Types of information that employees should have access to are about their plant, the equipment and machinery, the hazardous substances they handle and the work processes they must comply with. They should also be informed of hazards associated with new equipment, techniques and work processes. Information on, and causes of, workplace accidents is always useful in order for them to develop measures to minimize risks.

Information can be provided in various forms. It can be distributed to individual workers as memos and reports, or can be posted on the bulletin board. The board must be accessible to everyone. Information on OSH must also be an important part of the initial training at an employee's induction, since new staff are at a higher risk of accidents. Special emphasis must be placed on safety and health codes and practices during their job training. If employees are illiterate or from multilingual groups, employers must ensure that proper languages or visual aids be used.

The purposes of training are multifold. Employers aim at increasing safety and health awareness among managerial staff and employees at all levels. They try to ensure that the staff can demonstrate safe work practices, understand guidelines and legislation relevant to their work circumstances and put into practice what they have learned. Training needs depend on his/her place of work, tasks and responsibilities. It is therefore necessary to identify which groups require what kind of training in order to make the content relevant.

Training in OSH concepts and practices of newly recruited employees is absolutely essential. Anyone whose job has changed and who is required to work with new equipment/machines or environment should be trained at each change. In view of the fact that many accidents occur during maintenance, employers must make sure that the staff receive tailor-made training. All workers require training in the proper use and maintenance of their respective PPE, without which PPE can be useless. Finally, managers, supervisors and workers' SH representatives must be thoroughly knowledgeable on SH issues, practices and regulations relevant to their plants or to the employees they deal with. [72]

[72] The Australasian Meat Industry Employees' Union and the Meat Industry Federation of Australia, op. cit.

It is important that the content of training and training methods be reviewed and evaluated fairly often because work processes, techniques and machinery are constantly changing. Industry-specific guidelines, regulations and codes of practice should be revised and amended accordingly. Industry-specific new information related to OSH made available by various institutes should also be incorporated into training materials. Reviews and evaluations of any training programme is to ensure that the content remains relevant and appropriate to trainees.

6. National safety and health inspection

Various pieces of legislation and regulations concerning the safety and health of workers and the workplace are usually enforced by the directorate of occupational safety and health set up within the ministry of labour. While a complete system of safety and health inspection is still in the process of being developed in many developing countries, the existing system has never been fully satisfactory in most countries due mainly to insufficient manpower for adequate inspection. The task imposed on government authorities is to design the most effective system with limited resources to ensure safety and health in the workplace.

6.1 Safety and health inspection systems

Some countries may have safety and health (SH) inspectors specializing in certain sectors only. In most countries, however, they are responsible for inspecting all industries, including the meat, poultry and fish processing industries, covered by a specific legislation, by which they are given the authority to inspect. In the United States, the Occupational Safety and Health Administration (OSHA) in the Department of Labor reviews and redefines safety and health standards of workplaces set in the Occupational Safety and Health Act of 1970. It extends the coverage of the Act to all premises in all states and territories, except the establishments and farms for the self-employed and their immediate family members and other workplaces already protected by other federal statutes. [73]

Inspectors in India, whose fundamental powers and authority are provided mainly in the Factories Act of 1948, enforce safety and health standards in the workplace in 31 States and Union Territories. Since 1987, their power has been enhanced to increase their effectiveness. [74] Australian meat, poultry and fish processing workers and their workplaces are covered by the inspectors empowered by the relevant state and territory authorities since there are no Commonwealth employers in these specific sectors. [75]

In general, SH inspectors are those who make technical inspections and others who make medical inspections. The former's tasks include anything related to safety issues, such as checking the observance of safety regulations, investigating complaints with regard to

[73] US Department of Labor, Occupational Safety and Health Administration (OSHA): *All about OSHA*, Washington, DC, 1985 (Revised).

[74] H. Ono and K. Enomoto eds.: *Profile on Occupational Safety and Health in India*, Asian and Pacific Regional Centre for Labour Administration (Bangkok, ILO, 1992).

[75] Information provided by the Government of Australia, 1995.

safety at work and setting up inquiries into occupational accidents. The latter's responsibilities cover issues related to the hygiene and health of workers and occupational diseases in the workplace.

Inspectors' visits to workplaces can be classified largely into five types: general visits, special visits, visits after complaints, follow-up visits and informative visits. General visits are those carried out as routine work of inspectors to enforce safety and health standards in general. Special visits are motivated by the necessity of checking the application of specific regulations being targeted. Visits following complaints are conducted after alleged violations of standards or when unsafe or unhealthy working conditions are reported, usually by employees. Follow-up visits determine if previous violations have been corrected. Finally, inspectors cooperate with safety and health committees by providing them with information and training on prevention of occupational safety and health in the workplace. [76]

The inspectors' authority and power in enforcing safety and health standards may vary among countries. In general, they are authorized to enter without delay and at reasonable times any workplace without any notice for the purpose of inspection and investigation. They can also examine any records and documents relevant to the safety and health of workers and the premises. Furthermore, they may question any employer or employee, privately or with witnesses, to obtain necessary information. When they find any violation of safety or health codes, they are authorized to issue citations as well as to impose fines and penalties.

There is little information as regards the extent and frequency of inspections that meat, poultry and fish processing plants are subject to. The records of inspection in most countries do not have breakdowns by sector. The Inspection Activity Report of 1993 of the Ministry of Employment and Labour, Belgium shows that there was a total of 8,758 general inspections conducted by safety and health inspectors, including 876 follow-up visits, covering all industries. In the same year, a total of 3,778 special inspections, including 1,086 follow-up visits, was also conducted. In addition, a total of 1,264 inspections following complaints, including 470 follow-up visits, and 1,740 informative visits were carried out. However, no indication was given as to how many of these inspections were related to the meat, poultry and fish processing industries.

According to the information provided by the Government of Poland, a total of 222 inspections was conducted in 1994 in 217 meat processing enterprises where a total of 20,120 workers were employed. Included among them were ten state-owned and six cooperative enterprises. The following establishments became the target of these inspections: those that had poor records from the previous inspection; those that were newly established and those that were selected as representative enterprises from the ownership point of view.

During the course of these inspections in Poland, there were several types of safety and health violation reported. They most often involved electro-energetic, heat and gas installations, and consisted of 21.3 per cent of the total number of violations. The next most frequent problem was inappropriate state of buildings and work premises (15.4 per cent), followed by insufficient guards for dangerous machinery (14.3 per cent), lack of ventilation at work posts (8.2 per cent), inappropriate organization of work posts (88.1 per cent), unsatisfactory hygiene and sanitation of work premises (7.5 per cent), inadequate personal protection measures (7.3 per cent) and lack of or inappropriate medical examination of employees (6.8 per cent). The problems related to PPE involved mainly the equipment to

[76] Ministere de l'Emploi et du Travail: *Administration de l'Hygiene et de la medecine du Travail, Inspection Medical du Travail*, Rapport d'Activité 1993, Bruxelles, Belgique.

protect the hands and body against cuts, head protection in slaughtering and ear protection against noisy machines.

After these inspections, 3,930 decisions were taken by the inspectors. These included the issuance of letters of various natures (e.g. warnings, reminders, persuasion) to the management of enterprises in relation to 743 matters of violations and non-observance of safety and health codes. There were also 215 orders of temporary work stoppage issued because of hazardous work conditions and 159 cases of fines imposed on the employers who had violated certain provisions. Finally, there were 77 cases involving 161 workers where they were referred to other jobs because their skills were inadequate for the tasks they had been performing.

Compared with similar inspections conducted in the Polish meat industry in 1990, the results of 1994 were largely encouraging. Concerning noise in the workplace, for example, the number of violations of the highest admissible level dropped from 32 per cent of the total violations in 1990 to 1.5 per cent in 1994. The violations involving harmful substances fell sharply from 10 to 0.6 per cent, while those concerning machine guards increased slightly from 12 to 14.3 per cent. Those related to transport also declined from 6 to 3.4 per cent. The ones involving installations of various sources of energy increased from 13 to 21.3 per cent.

The results of these inspections indicate that the occupational hazards in the Polish meat industry occur mostly in certain areas. They include inadequate state of work premises, inappropriate organization or design of workstations, lack of adequate PPE and inadequate guarding of dangerous machines. Inappropriate state of work premises include inadequate ventilation and inappropriate installations of energy sources and equipment.

The results also revealed that the safety and health records in smaller and newly established enterprises were relatively worse. This might have been due to inadequate knowledge of safety and health issues of the employers. It could also mean that when new or small establishments aim at higher profits, they may neglect adequate investment in safety and health measures. In any case, these findings point out the areas on which future inspections should focus when resources for the inspection system are limited.

Resources and manpower for safety and health inspections in the workplace vary among countries, but they are generally inadequate in most countries. In the United States, for example, there are about 2,000 inspectors nationwide employed by the OSHA who are responsible for inspecting 6 million workplaces with 93 million employees. This means that on average a company can expect to see an OSHA inspector once every ten years. [77]

In order to carry out more effective activities with limited resources and manpower, OSHA has focused on certain types of inspection as priorities. Its top priority has been inspections involving imminent danger in workplaces. This concerns any condition where a danger exists that can be expected to cause death or serious injuries immediately. Other priority inspections have been investigations of catastrophes and fatal accidents, those which follow employee complaints, and those which are of a special nature focused on highly hazardous situations or substances. Should any of the above inspectional visits uncover any violations of safety and health rules and regulations, follow-up visits are normally conducted to see if appropriate corrective measures have been taken. [78] These focused and prioritized

[77] Frank Swoboda and Stephen Barr: "Guardian of Employee Safety is about to get a Work-Over", in *Washington Post*, 16 May 1995.

[78] US Department of Labor, op. cit.

inspection systems should have helped the OSHA achieve a higher efficiency in its role and function.

However, the latest approach to workplace inspections in the United States focuses on the worst offenders while relying primarily on voluntary compliance with federal safety and health regulations on the part of employers. This was a result of the Government's downsizing efforts which aim at increasing the protection of workers' safety and health, while decreasing red tape. This new inspection system is based on the test programme the United States Government has operated in the state of Maine.

In Maine, OSHA identified, through workers' compensation insurance claims, 200 companies with the worst safety and health records. These 200 companies represented 1 per cent of the State's employers and 30 per cent of the workforce, but accounted for 45 per cent of Maine's compensations for occupational injuries and diseases. These employers were visited by OSHA representatives and given two choices. One was to participate in a new programme in which the enterprise would set up management-employee teams to develop a comprehensive safety and health plan to remedy the problems. The other was to risk OSHA's traditional inspection approach, which could result in heavy penalties. Out of the 200, 98 per cent of the employers chose the first option. The results of this new approach are reportedly impressive. [79]

The inspectors' informative role in raising the awareness of employers and workers of occupational safety and health problems has been important. This role has become one of the essential parts of their responsibilities under the new approach in the United States. When management and employees become more aware of the fact that safe and healthy workplaces are beneficial to everyone concerned, they will learn to take their own initiatives without having to be coerced or reminded by inspectors. Until then, the latter will have to continue their campaign for voluntary measures for improvement, as well as to enforce regulations and impose fines and penalties. Again, good management employee cooperation seems to be the best solution in ensuring safety and health in the workplace where inspectional resources are limited.

6.2 Training inspectors

In view of the nature of their responsibilities, safety and health inspectors in most countries are required to have specific qualifications. This usually includes a degree or equivalent training and experience in mechanical engineering, chemical engineering, medicine or hygiene. In addition to having the required background, they undergo extensive training at the time of induction, as well as retraining to upgrade their skills and knowledge to cope with changing workplace situations.

The employment characteristics of Australian inspectors were studied in 1993-94. The results show that 80 per cent of them held a degree or diploma (including those in progress), while 70 per cent had specific qualifications in the area of OSH. In addition, 60 per cent had qualifications in specific areas, such as electrical trades. All of them had received in-house training and their average length of service as inspectors was eight years..

The nature and duration of their training varies among states. In New South Wales, newly recruited inspectors undergo intensive training for six months, while in South Australia, the training is for 17 weeks. These training courses, administered by experienced

[79] Swoboda and Barr, op. cit.

inspectors, consist usually of familiarizing the inspectors with various legislation concerning OSH and the resources for technical services available in the inspectors' office. Practical training in different divisions (e.g. engineering, dangerous substances, pressure vessels, etc.), field visits and techniques for OSH audits, inspections and accident investigations are also included. The last few weeks of their training are spent in reviewing or catching up on subjects in which they feel deficient. [80]

In the United States, the OSHA Training Institute in Des Plaines, Illinois, provides basic and advanced OSH training and education for federal and state personnel and consultants. It also trains employers and worker representatives from the private sector. It is equipped with various demonstration laboratories, audiovisual units, equipment, machinery, woodworking and welding shops and a complete industrial ventilation unit. Courses are given on electrical hazards, machine guarding, ventilation and ergonomics. There are also tailor-made courses for personnel in the private sector dealing with OSH in certain industries such as construction.

In addition, OSHA financially assists non-profit organizations to develop programmes and materials for educating employers and employees about their workplace hazards. Such grants are provided to help recipient organizations to develop their capabilities in providing training and related services in OSH to firms in the private sector. [81]

Newly recruited inspectors in most countries are trained in safety and health issues, such as machine guarding and ventilation, that are applicable to all industries. However, there are certain conditions or situations in the workplace that are characteristic to specific industries. PPE and machinery used in the meat, poultry and fish processing industries are different from those in other sectors. Safety and health issues in a cold, wet and often greasy workplace are entirely different from the work environment of, for example, electronics assembly-workers or textile workers. For this reason, it is desirable that inspectors receive more sector-specific training, in addition to general subjects. This would be useful when they train employers and employees in specific sectors during their informative visits.

7. ILO's role in OSH

Since its founding in 1919, the ILO has been active in improving living and working conditions throughout the world by establishing international labour standards in the form of Conventions and Recommendations. They cover many aspects of employment and labour issues, including occupational safety and health. When member States ratify any Conventions, they are obliged to apply the provisions of the Conventions ratified. They must also accept a measure of international supervision. By virtue of their ratification, they are required to conform their national legislation and practices with the provisions of the Conventions. Accompanying Recommendations are not subject to ratification, but provide specific guidelines to achieve the standard set in the Conventions.

[80] Paper entitled *Induction Training Program, Inspectors of Occupational Health and Safety, 1994,* for South Australia, provided by the Government of Australia.

[81] US Department of Labor, op. cit.

There are other forms of ILO activities concerning OSH. International, regional and national seminars are often organized to promote safety and health standards by raising awareness and understanding of relevant issues among the tripartite constituents. Advisory services and technical cooperation on specific OSH topics in certain sectors are also available. Collection and dissemination of information related to the above are also an important part of promoting improved safety and health in the workplace.

International labour standards in the field of occupational safety and health can be classified into four categories: those that provide protection against specific risks (such as asbestos and guarding machinery); standards that provide protection in specific branches of economic activity (construction, the maritime sector, mining); those that highlight specific protection measures (the medical examination of young workers, the prevention of occupational cancer); and standards that set policies for action, such as the Occupational Safety and Health Convention (No. 155) and Recommendation (No. 164), 1981, and the Occupational Health Services Convention (No. 161) and Recommendation (No. 171), 1985. [82]

There are a number of ILO Conventions and Recommendations on OSH that are applicable to the food, drink and tobacco industries as a whole, though none are specifically designed for workers in meat, poultry and fish processing. Of the Conventions and Recommendations adopted, some are more relevant to the industries concerned than to others, as they relate directly to the OSH problems of the workers. These include Convention No. 119 (guarding of machinery), 1963; Convention No. 127 (maximum weight), 1967; Convention No. 148 (air pollution, noise and vibration), 1977; Convention No. 155 (occupational safety and health), 1981; and Convention No. 161 (occupational health services), 1985 and their accompanying Recommendations.

The Guarding of Machinery Convention (No. 119), applicable to all power-driven machinery in all branches of economic activity, came into force in April 1965. As at 30 June 1996, a total of 48 ILO member States have ratified the Convention. The Convention provides that the sale, hire or transfer in any other manner or exhibition of machinery without appropriate guards shall, to such extent as the competent authority may determine, be prohibited by national laws or regulations. The obligation to ensure compliance with these requirements rests on the vendor or the person letting out on hire or transferring the machinery, or on the manufacturer. As regards power-driven machinery, the employer is obliged to ensure that only machinery with appropriate guards is allowed in the workplace. Furthermore, the employer is expected to bring national laws or regulations regarding the guarding of machinery to the notice of workers and to instruct them concerning the dangers in using the machinery. On the other hand, no worker is expected to use any machinery without the guards.

The adoption of this Convention marked an important shift in the approach taken in the prevention of occupational accidents caused by dangerous machinery. Previously, regulations on guarding machinery had concentrated on safety rules for its operation. But the cause of accidents often lies in the design and manufacture of potentially dangerous machinery. Moreover, the manufacturer and, in turn, the purchaser, may not be particularly concerned whether the machinery produced is equipped with the necessary safety devices. It is evident that laying all the responsibility for accident prevention on the workers places too much

[82] S. Tomoda: *Occupational safety and health in the food and drink industries*, Sectoral Activities Programme Working Paper, SAP 2.35/WP.62, ILO, 1993.

burden on them, and that effective protection could only be assured if the responsibility was shared equally by all those engaged in its production, purchase and use. [83]

The Maximum Weight Convention (No. 127), which came into force in March 1970, has been ratified by 24 ILO member States as at 30 June 1996. The Convention covers regular manual transport, including lifting and putting down, of loads by one worker and is applicable to all branches of economic activity. This Convention is relevant particularly to the meat industry where many workers suffer from back injuries from lifting and carrying heavy carcasses in non-mechanized workplaces. It provides that no worker shall be required to engage in the manual transport of a load which, by reasons of its weight, is likely to jeopardize his/her health or safety.

In applying this Convention, each member State is required to take appropriate steps to ensure that any worker assigned to the manual transport of loads receives adequate training or instruction in working techniques, with a view to safeguarding health and preventing accidents. It also advises the use, as much as possible, of suitable technical devices to limit or facilitate the manual transport of loads. And it recommends that loads carried by women and young workers be limited or substantially lighter than those allowed for adult male workers.

In addition to the provisions made in the above Convention, the accompanying Recommendation (No. 128) advises that there be a certified medical examination of fitness for employment and that it be repeated as necessary. With regard to technical devices, it recommends that the packaging of loads be compact, of suitable material, and equipped, as far as possible and appropriate, with holding devices, and designed as not to create risk of injury. Furthermore, it advises that 55 kg be set as the maximum permissible weight to be transported manually by one adult male worker.

With regard to the manual transport of loads by workers other than adult males, the Recommendation urges that, as far as possible, adult women workers not be regularly assigned to such work, and that the minimum age for such regular work be 18 years. Where it cannot be avoided, it suggests that their time spent on actual lifting, carrying and putting down loads be reduced as appropriate, and that certain arduous jobs be prohibited. It recommends, in particular, that no woman be assigned to such work during pregnancy or in the ten weeks following confinement if, in her physician's opinion, the work is harmful to her or her child's health.

The Working Environment (Air Pollution, Noise and Vibration) Convention (No. 148) and Recommendation (No. 156) were adopted in 1977. As at 30 June, 1996, a total of 38 ILO member States have ratified the Convention. Like others already discussed, this Convention is also applicable to all branches of economic activity. However, a ratifying State may exclude, after consultation with the social partners, certain branches from its application. Its application is also flexible in the sense that, after consultation with the social partners, a ratifying State may accept the obligations of the Convention separately in respect of air pollution, noise or vibration. Three of the 38 States that have ratified the Convention accepted the obligations in respect of air pollution only, while another State has accepted them in respect of air pollution and noise only. The rest have accepted them in respect of all three hazard areas. [84]

[83] ibid.

[84] Information provided by the Application of Standards Branch, ILO.

A State that has ratified this Convention is compelled by the provisions to prescribe measures, in the form of technical standards or codes of practice, for the prevention and control of, and protection against, occupational hazards in the working environment due to air pollution, noise and vibration. The competent authority is required to elaborate, in consultation with employers' and workers' representatives, the measures adopted for the practical implementation of the Convention. It is also obliged to establish criteria for determining the hazards of exposure to air pollution, noise and vibration and to specify their exposure limits, which are to be supplemented and revised in the light of up-to-date data.

The Convention requires employers to comply with the prescribed measures and workers with safety procedures relating to the prevention and control of hazards. If the measures fail to keep these hazards within the prescribed limits, workers need to be provided with PPE. The competent authority is required to regularly supervise these hazards. Workers or their representatives enjoy the right to present proposals, to obtain information and training and to appeal to appropriate bodies to ensure protection. The Convention also provides for tripartite collaboration where employers' and workers' representatives may accompany inspectors supervising the application of the measures prescribed in implementing the Convention.

The instruments discussed above deal with specific occupational hazards. The Occupational Safety and Health Convention (No. 155) and Recommendation (No. 164), on the other hand, aim to establish a systematic and comprehensive national policy on OSH for action at the enterprise level. They are applicable to all branches of economic activity. As at 30 June 1996, a total of 26 ILO member States have ratified this Convention.

Tripartite collaboration is the key factor for the effective application of this Convention and the accompanying Recommendation. Employers, for example, are responsible, in so far as is reasonably practicable, for ensuring the safety of the workplace, machinery, equipment and processes under their control. In addition, they need to take appropriate measures to ensure that the chemical, physical and biological substances under their control are without risk to health, and where necessary, provide adequate protective equipment to prevent any adverse effects on health. They need to provide measures to deal with emergencies, including first-aid facilities.

Workers, must cooperate with the employer by taking reasonable care of their own safety and of others who may be affected by their acts. They also need to inform their superior of any hazardous situation that they cannot correct themselves and to report any accident that occurs.

The other instruments that emphasize the need for tripartite collaboration are the Occupational Health Services Convention (No. 161) and Recommendation (No. 171), which aim to establish a coherent national policy on occupational health services. Adopted by the International Labour Conference in 1985, the Convention has been ratified by 15 ILO member States as at 30 June 1996.

This Convention and the accompanying Recommendation set out a comprehensive approach to keep the working environment safe and healthy through prevention and in a flexible manner, such as through the progressive development of occupational health services. Such services are to cover workers in all undertakings and establishments by means of laws, collective agreements or in any other manner approved by the competent authority in consultation with the social partners.

The services provided for in the Convention and Recommendation include surveillance of the working environment and of workers' health, participation in the design and

implementation of training programmes in respect of health and hygiene and the provision of first-aid and emergency treatment in the event of accidents. These instruments stipulate that occupational health services should adopt a multidisciplinary approach, while the composition and the qualifications of the staff be determined in the light of the nature of their duties. Measures need to be taken to ensure adequate cooperation and coordination between such services and other bodies concerned. While the health service staff should be completely independent from employers and workers, they still require their full cooperation in obtaining relevant information to enable them to identify health hazards and factors related to diseases in the workplace.

Adoption of international labour standards, such as those discussed above, is an achievement to a certain extent. They may, to varying degrees, serve as the basis for national legislation even in countries that have not ratified them. However, they reach their maximum impact only when they are ratified by and applied thoroughly in the ILO member States. As mentioned above, a large number of the ILO member States have not yet ratified the Conventions relevant to these sectors. This may mean that many workers in these sectors are being denied adequate safety and health protection. In view of this situation, the ILO continues to promote these standards, e.g. through educational programmes, as regards the meat, poultry and fish processing industries, as well as other sectors.

Summary

Global production, consumption and trade of meat, poultry and fish products have increased as growing affluence in many countries is raising the per capita protein intake. In some countries where meat consumption has been relatively high, the demand for bovine meat, in particular, has declined, due mainly to the consumers' increasing preference for poultry and fish products that contain a lower level of cholesterol. The recent outbreak of bovine spongiform encephalopathy (BSE) has had, at least in the short term, and in Europe, a negative effect on the demand for meat products. Nevertheless, global meat consumption has risen, while the demand for poultry products has expanded rapidly in many parts of the world. Global fish catch also declined due to over-fishing in the past, but is being offset by fish and shellfish production from aquaculture. The production and consumption of these products are expected to continue to rise, along with economic development.

Global employment has also increased. The employment in the meat industry in some industrialized countries stagnated or declined due mainly to lower product demand, but also to the introduction of new technology. However, some countries, where domestic demand fell, still have managed to prevent the employment from falling too much by expanding their exports. In many developing countries, it is expected to continue to rise in response to growing demand. Employment in the poultry industry has risen remarkably in many countries, despite increased mechanization. Employment in the fish- processing industry declined in many industrialized countries, but is believed to have risen in many developing countries when their output in recent years is considered. In view of an increasing global demand for these products, the total employment is expected to grow further.

Available data show that employees are usually paid less than others in the food, drink and tobacco industries. Among these three groups, meat workers are usually paid more than

others, while fish workers are paid the least. When men and women of similar skills are compared, women in all these sectors are paid less than their male colleagues.

It has been reported in some countries that work stress has increased in recent years. This is due partly to the gap in the levels of technology used. Many plants in these industries have undergone technological changes to increase productivity. However, certain tasks are still performed manually to ensure the products' values. Many cutters and deboners must therefore operate their knives manually. The gap in work speed between those with mechanical jobs and those with manual jobs sometimes creates tension, as the latter must adjust their work to the speed set by the former. This tension can cause stress to accumulate to the detriment of everyone concerned.

Frequency rates of accidents and diseases in these industries are generally much higher than those in other manufacturing industries in most countries where data are available. These three sectors share certain similarities that are attributed to their poor safety and health records: (1) the type of manual operation involving dangerous hand tools; (2) the gap in different levels of technology used, particularly when dangerous tools are involved; (3) the cold, wet and greasy work premises create perfect conditions which can easily lead to injuries; (4) perishable raw materials which sometimes carry dangerous micro-organisms can be the sources of contagious zoonosis, unless employees are trained to follow strict health measures during and after handling the materials.

Some improvement has been reported in safety and health records in these industries, but records have worsened in other respects. In some cases, despite improved accident/disease records, the total amount of compensation paid and the total number of workdays lost still increased due to a rise in the cost per case. The records need to be improved, which in turn will raise overall productivity.

Available information shows that these industries share features as to the types of accident and disease reported. The accidents include cuts, strains, sprains, bruises, fractures and smashing, and the disorders include the musculoskeletal, respiratory, auditory and circulatory systems, as well as zoonosis. A majority of the accidents take place in production areas, and machines, hand tools and the work environment are frequent causes of these accidents.

Compilation and analysis of data on accidents and diseases is the first step in assessing the hazards in the workplace, which should lead to appropriate measures to eliminate or minimize them. Such measures need to be monitored regularly and revised accordingly, since the work environment, machinery, tools and work methods are constantly changing. In order for such measures to be relevant and effective, both management and employees should help to identify risks, and propose solutions.

There are several measures that can deal effectively with safety and health problems. First, appropriate PPE needs to be provided. PPE does not eliminate risks, but it can protect workers if used properly. Secondly, machine guards must be properly installed. Machines should be designed so that their maintenance and cleaning can be done safely. Thirdly, ergonomics in the design of the workstation, tools, machines and work methods is essential in view of the many musculoskeletal disorders. Fourthly, an improved work environment and better housekeeping are the keys to safety and health. Better plant layout, adequate space for each worker, orderly storage, clear labelling of dangerous substances and adequate lighting can all improve OSH records. Fifthly, administrative control, or policies on job rotation, pauses, work speed and pre-employment medical screening, can minimize problems that are likely to result in injuries. Finally, measures against zoonosis, the origin and prevention of

which are already known, include immunization, a high standard of personal and plant hygiene and the use of proper PPE. However, more information is needed about BSE in order to ensure preventive measures.

Employers are obliged by law in many countries to provide their workers with a safe work environment, while workers are expected to observe safety and health rules and regulations. By cooperating with each other and sharing and exchanging information, they can deal more effectively with safety and health problems. One form of shared work is through a safety and health committee, where the representatives of both sides discuss risks, investigate causes of accidents, propose corrective measures and follow-up on proposed measures. The committee members are also usually responsible for information dissemination to and training of their fellow colleagues. However, as statistics on workplace accidents and diseases suggest, much more educational and training programmes are needed.

Safety and health inspection systems are not satisfactory in most countries due to lack of an adequate budget and manpower. In general, inspectors make routine visits, special visits related to specific regulations, visits after complaints are made, follow-up visits to determine if changes have been made, and informative visits where information and/or training is provided. In order to maximize resources, the priority of the inspectors in the United States is to first visit places where there is imminent danger, fatal accidents, employee complaints and hazardous situations or substances. Their most recent focus is to identify the worst safety and health offenders through workers' compensation insurance claims and to give those offenders the choice of either participating in a comprehensive safety and health programme or risking traditional inspection approaches, possibly with penalties.

There are no ILO Conventions and Recommendations targeted specifically to OSH problems in these sectors. However, several Conventions are relevant. They include Convention No. 119 (guarding of machinery), 1963; Convention No. 127 (maximum weight), 1967; Convention No. 148 (air pollution, noise and vibration), 1977; Convention No. 155 (occupational safety and health), 1981; and Convention No. 161 (occupational health services), 1985. The rate of ratification of these instruments by member States, however, has been low.

SECTORAL WORKING PAPERS

	Year	Reference
New Technology in Banking and Insurance: Relative Provisions and Collective Agreements (Edith Epstein)	1985	SAP 4.1/WP.1
The Socio-Economic Implications of Structural Changes in Plantations in Asian Countries (K.N. Sircar, J.P. Sajhau, A. Navamukundan, R. Sukarja)[1]	1985	SAP 2.1/WP.2
The Socio-Economic Implications of Structural Changes in Plantations in African Countries (J.A. Lugogo, L.A. Msambichaka and M.S.D. Bagachwa, J.A. Dadson, K. Tano)	1986	SAP 2.2/WP.3
Las implicaciones socioeconómicas de los cambios estructurales en las plantaciones de países de América latina y del Caribe (E. Torres-Rivas, M. Chiriboga, T.F. Clarke)	1986	SAP 2.3/WP.4
The Formulation and Implementation of Housing Policy in Sri Lanka: The origin and implications of the "Million Houses Programme" (Marni Pigott)	1986	SAP 2.4/WP.5
Labour and Social Effects of Restructuring in the Iron and Steel Industry (Oleg Stepanov)	1986	SAP 1.1/WP.6
The Teller and the Terminal: The Effects of Computerisation on the Work and on the Employment of Bank Tellers (Michael Bell)	1988	SAP 4.2/WP.7
Social and Economic Effects of El Cerrejon Coal Project in Colombia (James Jonish)	1987	SAP 2.5/WP.8
Income of Workers in the Hotel, Catering and Tourism Sector (A. Faymann)	1987	SAP 6.1/WP.9

[1] Out of print

	Year	Reference
Social and Labour Effects of Computer-Aided Design and Computer-Aided Manufacturing (CAD/CAM), (Karl-H. Ebel and Erhard Ulrich)	1987	SAP 1.2/WP.10
La participation des femmes aux coopératives (D. Mavrogiannis)	1987	SAP 5.1/WP.11
La mobilisation de l'épargne rurale par les institutions de type coopératif et son impact sur le développement local dans sept pays africains - synthèse de sept études de cas : Burkina Faso, Cameroun, Egypte, Nigeria, Rwanda, Togo, Zimbabwe (Gilbert Renard)	1987	SAP 5.2/WP.12
Rural Savings Mobilisation by Co-operative Institutions and its Impact on Local Development in Seven African Countries - Synthesis of Seven Case Studies: Burkina Faso, Cameroon, Egypt, Nigeria, Rwanda, Togo, Zimbabwe (Gilbert Renard)	1988	SAP 5.2/WP.12
Coopératives à buts multiples dans les régions rurales des pays en développement (Albert Benjacov)[1]	1987	SAP 5.3/WP.13
Social and Economic Conditions in Plantation Agriculture in Kenya - Proceedings of a Tripartite Workshop organised by the International Labour Office at Egerton University College, Njoro, Kenya, 4 - 8 May 1987 (J.P. Sajhau)	1988	SAP 2.6/WP.14
Productivity and its Impact on Employment and on the Working and Living Conditions of Iron and Steel Workers (Oleg Stepanov)	1988	SAP 1.3/WP.15
Social and Economic Implications of Tea Processing - The Experiences of India and Kenya (B. Sivaram and G.A. Orao Obura)	1989	SAP 2.7/WP.16

[1] Out of print

	Year	Reference
Economic and Social Implications of Sugar Cane Processing in Developing Countries (T. Hannah, International Sugar Organization)	1989	SAP 2.8/WP.17
Social and Labour Consequences of Economic and Technological Change in Civil Aviation (A. Gil)	1989	SAP 2.9/WP.18
Les implications socio-économiques de la transformation primaire du coton en Afrique francophone (M. de Sahb)	1989	SAP 2.10/WP.19
Socio-economic Implications of Primary Processing of Plantation Crops in Malaysia. Rubber and Palm-oil (M. N. Navamukundan)	1989	SAP 2.11/WP.20
Production, Employment and Wages in the Coffee Processing Sector of Brazil (G. Maia Gomes)	1989	SAP 2.12/WP.21
Social and Labour Aspects of Urban Passenger Transport in Selected African Countries (A. Gil)	1989	SAP 2.13/WP.22
Petroleum Training in Algeria and Nigeria (J. McLin)	1989	SAP 2.14/WP.23
Training and Technological Development in the Petroleum Sector: The cases of Norway and Brazil (Jan Erik Karlsen and Henrique Rattner)	1989	SAP 2.15/WP.24
Les coopératives et l'auto-assistance mutuelle face à la pauvreté urbaine dans les pays en développement (C. Jacquier)	1989	SAP 5.4/WP.25
Female Participation in the Construction Industry (J. Wells)	1990	SAP 2.16/WP.26

	Year	Reference
The Social Protection of Artists and Performers: The Situation in Selected Industrialised Countries (Jean-Pierre Dumont, Annie-Paule Gollot and Francis Kessler)	1990	SAP 4.3/WP.27
La protection sociale des artistes: la situation dans quelques pays industriels (Jean-Pierre Dumont, Annie-Paule Gollot et Francis Kessler)	1990	SAP 4.3/WP.27
Technological Change in the Iron and Steel Industry and its Effect on Employment and Training (S. Moinov)	1990	SAP 2.17/WP.28
Workers' Housing Co-operatives in Turkey: A Qualitative Evaluation of the Movement (A. S. Ozüekren)	1990	SAP 2.18/WP.29
Socio-Economic Conditions in Plantations in India. Proceedings of a National Tripartite Workshop (International Labour Office)	1990	SAP 2.19/WP.30
L'emploi dans l'industrie pétrolière (Inès Lemarie et Christophe Barret)	1990	SAP 2.20/WP.31
Les tendances de l'emploi, de la production et du commerce dans la filière textile: situation actuelle et perspectives (Marcel de Sahb)	1990	SAP 2.21/WP.32
The Role of Petroleum Industries in Promoting National Development: Report of a Latin American Regional Symposium (Laura Randall)	1990	SAP 2.22/WP.33
The Internationalisation of Print: Trends, Socioeconomic Impact and Policy (Richard McArthur)	1990	SAP 2.23/WP.34
The Problems of Women Teachers in Technical and Vocational Education in Kenya, Tanzania and Zambia: an Exploratory Report (Kathleen Lynch)	1990	SAP 4.4/WP.35

	Year	Reference
Safety and Health Problems in Small and Medium Scale Textile Enterprises in Five Developing Countries (L. Li)	1990	SAP 2.24/WP.36
The Status of Women Teachers in Southern Africa (Catherine Gaynor)	1990	SAP 4.5/WP.37
Socio-Economic Conditions in Plantations in Tanzania: Proceedings of a National Tripartite Workshop organised by the International Labour Office at Morogoro, 23-27 April 1990 (Edited by J.P. Sajhau)	1990	SAP 2.25/WP.38
Adjustment and Restructuring in Plantations: The Case of Sugar-cane in Mauritius and Negros Occidental (Philippines) (J.M. Paturau (Mauritius) and T.S. Untalan (Negros Occidental)	1990	SAP 2.26/WP.39
The communication of phonograms to the public: Remuneration of performers and producers (Pierre Chesnais)	1991	SAP 4.6/WP.40
Iron and Steel Producers: Fourteen of the Smaller Players (Stephan Moinov)	1991	SAP 2.27/WP.41
Professional and Managerial Staff: Their Place in the Labour Relations System of Canada and the United States (Michael Bendel)	1991	SAP 4.7/WP.42
Producers' Small Scale Industrial Co-operatives Some Case Studies from Developing Countries (Malcolm Harper)	1991	SAP 5.5/WP.43
La condition de l'artiste (André Nayer and Suzanne Capiau)	1991	SAP 4.8/WP.44

Gestion des ressources humaines dans le secteur public: Réflexion méthodologique à partir de l'étude de quelques projets de coopération technique conduits par le Bureau international du Travail (Joël Cauden et José Trouvé)	1991	SAP 4.9/WP.45
Labour Market Flexibility: The Challenge Facing Senior Medical Officers in New Zealand (Ian Powell)	1991	SAP 4.10/WP.46
Crise et assainissement des services publics africains. Le cas des services de fourniture d'eau et d'électricité et des transports au Cameroun, Niger et Sénégal (Patrick Plane)	1991	SAP 4.11/WP.47
Manpower Aspects of Restructuring Railways in Developing Countries: A synthesis of six country case studies (A. Silverleaf)	1991	SAP 2.28/WP.48
Negotiating technological and structural change in Australia Post (R. Lansbury)	1992	SAP 4.12/WP.49
Women in scientific research in Australia (C. Macpherson)	1992	SAP 4.13/WP.50
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Human resource management issues in developing country public enterprises (petroleum/chemical sectors) (D.G.M. Cheshire)	1992	SAP 2.30/WP.53

	Year	Reference
The restructuring of the Japanese National Railways: Effects on labour and management (S. Watanabe)	1992	SAP 2.31/WP.54
El sector bancario argentino: El impacto de los cambios tecnologicos y estructurales sobre el trabajo y el empleo (J.C. Neffa)	1993	SAP 4.15/WP.55
An industry steels itself for change (S. Moinov)	1993	SAP 2.32/WP.56
Un atout pour la santé: La rémunération du personnel infirmier (A. Brihaye)	1993	SAP 4.16/WP.57
Les conditions d'emploi des travailleurs des plantations: Compte-rendu d'un atelier tripartite national (P. Egger)	1993	SAP 2.33/WP.58
Ajustement structurel, politiques agricoles et efforts d'adaptations paysannes en Côte d'Ivoire (M. Allechi, Y. Affou, D. Ngaresseum)	1993	SAP 2.34/WP.59
White-collar unionism in selected European countries: Issues and prospects (E. Kassalow)	1993	SAP 4.17/WP.60
Les enjeux des services bancaires: hommes, techniques et marchés (J. D'Alançon)	1993	SAP 4.18/WP.61
Occupational Safety and Health in the Food and Drink Industries (Shizue Tomoda)	1993	SAP 2.35/WP.62
Employed or Self-Employed? Contract Labour in the British Construction Industry (Julian Birch)	1993	SAP 2.36/WP.63
The effects of technological and structural changes on employment in major Irish banks (Noelle Donnelly)	1993	SAP 4.19/WP.64

	Year	Reference
La banque française en mutation: marché, profession, organisation, culture (E. Blaustein, M. Dressen)	1993	SAP 4.20/WP.65
Nurses' pay: A vital factor in health care (A. Brihaye)	1993	SAP 4.21/WP.66
Part-time and temporary employees in the Public Service in Japan (Seiichiro Hayakawa)	1993	SAP 4.22/WP.67
La situación de las mujeres docentes en centroamérica: Hacia la igualdad de oportunidades y de trato (Mafalda Sibille Martina)	1994	SAP 4.23/WP.68
Por la remuneración equitativa del personal de enfermería (A. Brihaye)	1994	SAP 4.24/WP.69
Privatization of public services and public utilities (C. Oestmann)	1994	SAP 4.25/WP.70
Les droits syndicaux des cadres: Une perspective internationale (Claire Dupont-Sakharov et Laure Frexinos)	1995	SAP 4.26/WP.71
Consequences for Management and Personnel of the Reorganization of Railways in the Russian Federation - 1990-92 (Irene Valkova)	1994	SAP 2.37/WP.72
Trends and Perspectives in the Nursing Profession Christine Hancock, James Buchan, Phil Gray; (Cécile Fontaine; Sholom Glouberman; Tom Keighley)	1995	SAP 4.27/WP.73
Trade union rights of managerial staff: An international perspective (Claire Dupont-Sakharov and Laure Frexinos)	1995	SAP 4.28/WP.74

	Year	Reference
Los derechos sindicales del personal dirigente: una perspectiva internacional (Claire Dupont-Sakharov and Laure Frexinos)	1995	SAP 4.29/WP.75
Productivity, employment and industrial relations in coal mines Two case studies from the Czech Republic and the Russian Federation (Edited by Norman S. Jennings)	1994	SAP 2.38/WP.76
Productivity, employment and industrial relations in coal mines Three case studies from China, India and Zimbabwe (Edited by Norman S. Jennings)	1994	SAP 2.39/WP.77
Productivity, employment and industrial relations in coal mines Three case studies from Australia, United Kingdom, United States (Edited by Norman S. Jennings)	1994	SAP 2.40/WP.78
Atmospheric pollution control: How much of a threat to coal? (Sonja Boehmer-Christiansen)	1994	SAP 2.41/WP.79
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Contract labour in Malaysian plantation, construction and sawmilling industries: A survey report (Lee Kiong Hock and A. Sivananthiran)	1995	SAP 2.42/WP.81
Sectoral trends in world employment (Jaroslaw Wieczorek)	1995	SAP 2.43/WP.82
Les femmes enseignantes dans l'enseignement technique et professionnel au Bénin, en Côte d'Ivoire, au Mali, au Sénégal: Une étude comparative (Soledad Perez)	1995	SAP 4.31/WP.83

	Year	Reference
Occupational stress and burn-out of teachers: A review (Tom Cox and Amanda Griffiths)	1995	SAP 4.32/WP.84
Gender and employment on sugar cane plantations in Tanzania (Marjorie Mbilinyi with Ave Maria Semakafu)	1995	SAP 2.44/WP.85
Various forms of employment in the food and drink industries (Shizue Tomoda)	1995	SAP 2.45/WP.86
L'ajustement dans le secteur public et la gestion des ressources humaines: le cas du Sénégal (Abdoul Aziz Tall)	1995	SAP 4.33/WP.87
Privatization in Mauritius: Semi-privatization, Counter-privatization and Closure (P. Ujoodha)	1995	SAP 4.34/WP.88
L'ajustement structurel dans le secteur public et la gestion des ressources humaines: Le cas du Mali (Mohamed Moustapha Sissoko)	1995	SAP 4.35/WP.89
Document d'orientation sur les politiques de privatisation du secteur public (Alain Adérito)	1995	SAP 4.36/WP.90
Women workers in manufacturing, 1971-91 (Shizue Tomoda)	1995	SAP 2.46/WP.91
Adjustment in the public sector and management of human resources in Mauritius (Raj Mudhoo)	1995	SAP 4.37/WP.92
Privatization in the iron and steel industry (Stephan Moinov)	1995	SAP 2.47/WP.93
Privatization and human resource issues in the Caribbean sugar industry (Clive Y. Thomas)	1995	SAP 2.48/WP.94

	Year	Reference
Foreign labour in the Malaysian construction industry (A.-R. Abdul-Aziz)	1995	SAP 2.49/WP.95
Recherche de la productivité et rentabilité dans le secteur bancaire: théories, pratiques et conséquences sur la gestion des ressources humaines (Edgar Blaustein et Marnix Dressen)	1995	SAP 4.38/WP.96
Proceso de privatización en Argentina y Brasil: Consecuencias en materia de mercado de trabajo y desempeño empresarial Practicas utilizadas para el ajuste de personal (Enrique Saravia)	1995	SAP 2.50/WP.97
Deregulation of Road Freight Transport: Labour Implications (Yukari Suzuki)	1996	SAP 2.51/WP.98
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ILO industrial committees and sectoral activities: An institutional history (Edward Weisband)	1996	SAP 2.53/WP.100
Productivity improvement and labour relations in the tea industry in South Asia (B. Sivaram)	1996	SAP 2.54/WP.101
Egalité des chances entre les hommes et les femmes des catégories cadres et professionnelles (J. Laufer)	1996	SAP 4.39/WP.102
Health care personnel in Central and Eastern Europe (J. Healy/C. Humphries)	1996	SAP 4.40/WP.103
Safety and health of meat, poultry and fish processing workers (S. Tomoda)	1996	SAP 2.55/WP.104